ESSAYS

ON

THE THEORY OF CONVULSIVE DISEASES.

ESSAY I.

ON THE CONVULSIVE AFFECTIONS OF INFANTS, AND ESPECIALLY LARYNGISMUS;

ESSAY II.

ON THE CONVULSIVE DISEASES IN ADULTS, AND ESPECIALLY EPILEPSY;

BY

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TO

THOMAS WATSON, M.D. ETC. ETC.

My dear Sir,

You had the candour and the generosity early to applaud and encourage my labours in the Nervous System; permit me, therefore, to inscribe these Essays, a first fruit of their application to practical medicine, with your distinguished name,—distinguished no less in your Academical than in your brilliant Professional career.

I am,

My dear Sir,

Your very faithful and obliged friend,

MARSHALL HALL.

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INTRODUCTORY NOTE.

WITHIN the eranium and the spinal canal there exists a most important part of the nervous system, called, from its locality, eerebro-spinal. It is an important question in physiology—Of what does this organ eonsist?

As the chemist takes up a mineral, familiar to him in its external appearanee and general eomposition, and, subjeeting it to a new and rigid analysis, discovers new elements previously unsuspeeted, so I have been led to treat the eerebro-spinal axis, as it has been termed, and I have deteeted in it a new element of vast extent and importance.

This axis was formerly supposed to eonsist of the eerebrum and cerebellum with the intra-spinal *chord* of eerebral nerves, of the intra-spinal connexions of the ganglionic system, and, according to Sir Charles Bell, of a respiratory tract. Beyond these, I believe, nothing was known, nothing even suspeeted.

There is, however, another element, the spinal eentre of a system of ineident and reflex nerves, the seat of a peeuliar power, physieal in its nature, exeito-motor in its mode, and reflex in its form, of aetion; the nervous organ of all the acts of ingestion and of egestion in the animal œeonomy, and therefore of all the acts whieh tend to the preservation of the individual and the perpetuation of the raee, and of none more than of the vital funetion of respiration.

This system, whieh I propose to designate the *spinal system*, in contradistinetion to the eerebral and the ganglionic, is also the seat of the *Class* of eonvulsive diseases, and the seat of aetion of a *Class* of remedial agents.

One would think there is suffieient in such a diseovery as this to ensure the eandour, if not the favour and gratitude,

of a profession whose object is one of benevolence. Such an idea is founded in error. Well has Archbishop Whately observed—

"In proportion as any branch of study leads to important and useful results—in proportion as it gains ground in public estimation—in proportion as it tends to overthrow prevailing errors,—in the same degree it may be expected to call forth angry declamation from those who are trying to despise what they will not" (or cannot) "learn, and wedded to prejudices which they cannot defend. Galileo would probably have escaped persecution, if his discoveries could have been disproved, and his reasonings refuted. The same spirit which formerly consigned the too powerful disputant to the dungeon or the stake, is now, thank Heaven! compelled to vent itself in railing, which you need not more regard than the hiss of a serpent which has been deprived of its fangs*."

I know not what treatment could have induced the learned author to write these words; but I venture to affirm that it was not more iniquitous than that which has been inflicted on the THEORY—of *hypothesis* there is none—which has guided me throughout the discussion set forth in this paper, which may be viewed as a specimen of what may be done for the whole class of the diseases of the nervous system.

The best reparation must consist in the publication of a series of Essays, in which the value and importance of the doctrine are shown in its practical application to pathology and therapeutics. That doctrine—the doctrine of the distinct spinal system;—of incident and reflex nerves, in special conjunction with their spinal centre—the excitor nature—the reflex form of its actions—the special organs and functions under its control;—that doctrine—the anatomy and the physiology of the spinal system, has, in effect, become pathology and therapeutics! The nerves, the actions, the functions involved, are the same in health and in disease; an experiment has been made to present the type of a malady, and to teach us what we ought to do to succour our patient, when in extreme suffering, and in the utmost peril!

* Lectures on Political Economy.

These views, well and profoundly impressed on the mind of the physician, are to the Diseases of the Nervous System, what the Stethoscope is to the diseases of the heart and lungs—their great Diagnostic;—a new intellectual sense, as it were, enabling us to distinguish between diseases of cerebral, spinal and ganglionic origin.

Of the Spinal System, the medulla oblongata is the most vitally important portion, presiding, as the key-stone of a Reflex Arc, over the movements of the larynx and of respiration.

Now the *Class* of convulsive diseases may be divided into those in which the larynx—(or pharynx)— is affected, and into those in which this important organ escapes; into those therefore in which

The Medulla Oblongata,

and into those in which

The Medulla Spinalis,

is principally affected—a distinction at once novel and of the very deepest interest.

All this is depicted—placed before the eye itself—in the admirable plates which, thanks to Mr. Simpson, of Stamford, accompany my New Memoir, published in 1844; and it constitutes the *first* and *only* example of what I may term LIVING *pathology* so pourtrayed. In that Memoir will be found the preliminary knowledge required for the prosecution of the momentous inquiry, of which the following pages present the reader with one or two unfinished specimens.

The other work requisite to the inquirer into the diseases of the nervous system, is the "Recherches sur le Systême Nerveux," of M. Flourens. This work *must* be known by any one who would prepare himself for the investigation into the nature and treatment of the diseases in question. Every word of this work deserves to be printed in characters of gold.

It has been too much and too long the habit with physicians, as well as with the public, to regard one of the subjects of the following Essays as an incurable malady: the errors have been, to neglect the just diagnosis between the incurable and the curable cases, and to treat all empirically instead of rationally, trusting to a supposed remedy, instead of inculcating a system of remedies and of remedial measures.

ESSAY I.

ON THE

THEORY OF CONVULSIVE AFFECTIONS OF INFANTS,

AND ESPECIALLY OF LARYNGISMUS;

Being an Essay read before the Medical Society of London, May 17, 1847.

I NEED not inform the members of this venerable Society that I have been for many years engaged in an investigation of the nature and physiological application of a certain principle of action and series of phenomena in the nervous system, which I have designated excito-motor and reflex, and limited to the spinal centre, with its associated incident and reflex nerves, exclusively of the cerebral and ganglionic systems.

But it *is* necessary to state that the subject of this investigation has a *practical* application to the diagnosis, pathology, and treatment of a certain Class of diseases, of which a tithe is not yet known.

It is this *Practical Application of our knowledge of the* REFLEX SPINAL SYSTEM of which I beg to lay a specimen before this Society on the present occasion. Its members will, I am persuaded, receive in good part the observations and suggestions which I am about to lay before them.

It is lamentable to observe the supineness of the profession generally in regard to improvements which require a little unbiassed attention—a profession, the objects and aims of which are so elevated and noble, but of which the welcome of new scientific truths must be admitted to be tardy, and the approbation niggard. In medicine alone, improvement is without recompense.

But science ought to be pursued for its own sake, irrespective of consequences, and the reward should be in the conscience. It is with these views that I beg, this evening, to submit to this Society the following observations on the nature of the convulsive affections of infants and children,—observations which are the first—or amongst the first—of a series of *Contributions from the Science of Physiology to the Art and Practice of Medicine.*

It has long been the habit of the indolent of our profession to decry physiology, and especially experiment. I will venture to affirm, that such persons are incapable of grasping the question which I am about to discuss—viz. the nature, diagnosis, and treatment of convulsive diseases and of their effects. The greater part of this question is involved in the recent investigation relative to the excited reflex actions; and he who has not witnessed, or whose eye is not familiar with, these phenomena, as displayed in experiments, is utterly unprepared to comprehend, and to treat adequately, the class of convulsive diseases. Books cannot convey this knowledge. Books do not contain it. We have only to read the attempts to apply the principle of the excited reflex actions to practice, even by those who might seem to know something of the matter, to perceive the utter insufficiency of book-knowledge for this purpose.

No. He who would conscientiously perform his duty as a physician, in these affections, must submit to the drudgery, often fraught with pain as well as toil, of reading the book of Nature. He must have both his eye and his mind tutored to distinguish between the effects of volition, the phenomena of emotion, and the reflex actions of the excito-motor power.

With an eye so tutored, there is no danger of mistaking the phenomena of convulsive diseases. All is plain, simple, useful. The practical physiologist, the physiological physician, sees, that strabismus, the contracted finger, the contracted toe, are one and the same kind of affection, in different parts of the muscular system; that the partial closure of the larynx, inducing laryngismus stridulus, and the total closure of the larynx, suspending the respiration; that strangury and tenesmus, are of the same nature, only seated in other and more vital or important organs; lastly, that the general con-

vulsions of the face, and of the general frame, are still similar morbid phenomena, differing only in their degree of diffusion and intensity, and in being often of centric origin. He perceives that it would be as unphilosophical and unreasonable to think, and speak, and treat of the condition of the larynx separately, and to view the case as one of partial paralysis, or of inflammatory action, as so to view the affection of the muscles of the eyeball, the fingers, or the toes, which differ in no respect from that spasmodic affection of the larynx, except in their less formidable import.

To the eye of the practical physiologist, and to no other, the *series* of symptoms in convulsive disease presents fearful, *excited, reflex* actions in the human subject. *He* sees how peculiar and specific they are in their character, and how peculiarly and specifically they are connected with the true spinal system, anatomically and physiologically. In a word, *he* alone possesses the secret cipher by which this mysterious page of Nature may be read. We might as well pretend to understand fever itself from books, as physiology, with its practical applications. Such is the nature of practical physiology; such the inconsiderate folly of those who, in the present day, as in the day of the immortal Harvey, decry wise, judicious, well-devised experiments.

The time is coming—though it may yet be distant—when the "mere practical man" will be viewed as the mere empiric, which he is, in fact; and when to know the nature and modes of action of the springs of life, will be accounted the appropriate preparation for the investigation, prevention, and treatment of diseases.

If I wished to set forth, in the most vivid manner, the great reality and importance of the recent progress in our knowledge of the nervous system, and its influence on pathology and practice, I should appeal to the condition of medical opinion on the subject of the convulsive diseases of infants and children twenty years ago and at the present time. Cerebrum was confounded with spinal marrow; the sympathetic explained every thing, and yet, as Professor Müller has sarcastically said, nothing. Even recently, it has been a question whether the symptom termed laryngismus, though forming a part of a general convulsive or spasmodic affection, and

being of a transitory character, and having its analogue, as it were, in the epilepsy of adult age and other convulsive diseases, be of the nature of paralysis or of spasm!

§ 1. *The Subject of Investigation.*

There is no more terrific disease than infantile convulsion —none more deplorable in its consequences to mind, or limb, or life; for the little patient may remain an idiot, or a cripple, or the subject of future epilepsy, even should life be spared. Well, then, does this theme merit the attention of this Society.

The first question which presents itself is—What are the causes or sources of infantile convulsive affection?—in what modes are such affections induced?

The second question is—What are the precise forms assumed by these convulsive affections?

The third—What are the effects of these affections on other organs?

The fourth—What is the diagnosis of the different forms of convulsive disease?

The fifth—What are the modes of prevention and treatment?

In a word, it is the CAUSE, the PATHOLOGY, the LIVING pathology, the varied FORMS, the DIAGNOSIS, and the PREVENTION and treatment, of the convulsive diseases of infants, to which I wish to draw the attention of this Society and of the profession, pointing out the inestimable value and importance of the distinctions of the spinal from the cerebral and ganglionic systems, in the solution of these practical questions.

I have selected the subject of INFANTILE convulsive affections as being the most distinct and obvious of the Class of convulsive diseases. On a future occasion, I propose to treat of the convulsive or spasmodic affections which occur in the *intra-uterine*, the *medi-œtal*, the *adult*, the *puerperal* periods of time or existence; applying to these the principles of investigation which I have exemplified in the present Essay.

§ 2. *The Terms employed.*

Various terms have been employed to denote the various forms and symptoms of convulsive disease; and *one* especially

has been so employed as to appear to give to one form of this affection a distinct existence and importance—I mean that of *laryngismus ;* and this has led to much confusion and error in treating of this affection.

It is, in fact, as if we were to treat of cough, or any other mere symptom of disease, as a distinct disease.

Laryngismus is a symptom of disease, often a very severe one, but still only a symptom. It has been further distinguished by the epithet *stridulous,* which, however, is unnecessary, if we be only informed on the subject. There is only one kind of laryngismus, and this one is not always stridulous. In its worst and most dangerous form, indeed, it is a *silent,* because a complete, closure of the larynx.

The term laryngismus may be retained. Without intention on his part, the proposer of it chose a designation which associates itself very appropriately with that of another partial form of convulsive disease—viz. strabismus. And other symptoms of convulsive affection may receive designations which will assimilate equally well together and with these ; such are cheirismus and podismus, for the spasm of the wrists, the hands, or the fingers, or of the feet or toes, or the carpo-pedal spasm, as these have been called; whilst the term sphincterismus may be used to designate the spasmodic affections of the sphincter ani, or neck of the bladder, assuming the form of tenesmus or strangury.

Let the termination in *ismus* be used only to designate a *symptom,* and that of a purely nervous or spasmodic or convulsive character.

Laryng*ismus* will henceforth be viewed merely as a symptom, as cough is a symptom, to be traced to its origin,—to the special disease on which it depends,—and will no longer be confounded with laryng*itis,* as I fear it still is by some practitioners.

A reform in nomenclature is at once the usual result of progress in medical science, and the efficient cause of improvements in the art and practice of medicine.

§ 3. *The Predisposition.*

The predisposition to convulsive affection, and especially to that form of it which has been designated laryngismus, is

sometimes so marked, that all the children of a numerous family have been successively affected with this disease. Such an instance was published, by a father, in the Lancet, in April, 1841. Such instances have been observed by all physicians of experience.

Dr. W. Tyler Smith observes in a note to me—"I attend a family in which there have been six children. Three were born, and passed through infancy, at Hull; they had no laryngismus; but one of the three died of the cerebral effects of general convulsion. Of the three younger children, one was born in a healthy situation in the suburbs of London, and during dentition had laryngismus, which on many occasions passed into general convulsions; the next was born in Pall Mall, and was also affected with laryngismus and general convulsions. This child became affected with hooping cough when fifteen weeks old, and each fit of coughing excited laryngismus, and then violent convulsions, which proved fatal by producing cerebral effusion. The third, an infant five weeks old, also born in Pall Mall, is just beginning to have crowing respiration.

"All these children have had difficult dentition, and a poor supply of breast milk, owing to delicate health on the part of the mother."

Whether this predisposition be hereditary, or be induced by external circumstances, has not, perhaps, yet been accurately determined. I suspect that the effects of *locality*, as a damp soil, has frequently constituted the predisposing cause of this affection, and that a total change of residence is as important, as a corrective of this predisposition, as a change of air has appeared to be in the actual attacks; and this both for the safety of the individual patient, and that of future children of the same parents.

But I must also add that I have known the children of different branches of the same family to be liable to this affection, though the localities have been distant from each other, as in the case just quoted.

§ 4. *The Causes, remote and proximate.*

No irritation of the substance of the cerebrum or cerebellum can produce muscular spasm or contraction *immediately*.

This fact is the result of all experiments on animals, and of all observations on the human subject. No disease, therefore, *limited*, in itself and in its effects, absolutely, to the cerebrum and cerebellum, can be the cause of convulsion.

But irritation of the *membranes* within the cranium produces various muscular contractions—a fact which I ascertained in an important experiment, which I carefully detailed in the second series of my "Observations and Suggestions in Medicine," p. 64. No doubt *disease* sometimes acts as an irritant to these membranes, and produces its peculiar effects, or symptoms—a fact for which we are indebted, with the light which it throws upon diagnosis, to experimental physiology.

But it is when a source of irritation is applied to the medulla oblongata, or medulla spinalis, that the most energetic and frightful forms of muscular contractions, or of convulsions, are induced.

Lastly, when certain nerves connected with the spinal marrow, which I have designated the incident spinal nerves, are irritated, especially at the points of their origin in the cutaneous, mucous, or other tissues, various muscular contractions, now designated excited and reflex, occur. Excited through the medium of these incident nerves, the spinal centre sends forth its influence along certain muscular nerves specially associated with the former, and peculiar muscular actions ensue.

I think it probable that many convulsive affections and their dire effects have their origin *in utero;* certainly many of the latter are congenital. How carefully has nature protected the susceptible fœtus! and may I not add, how incautiously have we all, in testing the existence of a fœtus, or of life in the fœtus, applied our hand taken fresh out of cold water, or sudden pressure, or succussion, over the region of the impregnated uterus! May not this and similar acts or accidents have been the unsuspected cause of some congenital nervous affections, as podismus (club-foot)?

Infancy is the most excitable period of human existence, whilst it is exposed to its own peculiar sources of irritation.

Of these, one is the peculiar condition of the gums and of the alveolar processes, which occurs during dentition. It is

one of great vascular action and fulness, and of consequent tumefaction, and pressure on the dental nerves.

Another excitement frequent in the age of infancy is that arising from the condition of the stomach, in cases in which food has been given in quantity or quality not easy of digestion. The gastric acid is then secreted in undue measure, adding this source of irritation to that of indigestible aliment.

It is a singular fact, that the age of convulsive diseases is specially that of dentition, and of what I may term dubious diet. Dentition, as I understand the term, begins at birth, or even before; it is then that the tissues of the alveolar processes and cavities become the seat of augmented vascular action and nervous excitement, which do not cease until dentition is completed.

It is a well-known fact, that there is a greater mortality amongst children deprived of their nurse and natural food, and, as the phrase is, "brought up by the hand," than amongst children that are duly nursed. Whether this greater mortality depends on the greater prevalence of *convulsive* diseases is not so well determined. This is a question still requiring careful investigation.

It is difficult to determine the best kinds of food for infants deprived of the breast. Diluted cow's milk, but especially asses' milk, would seem the most natural, whilst the wholesomeness of *farinaceous* food is at least questionable.

A third source of irritation is that which arises from morbid matters retained in the lower part of the alimentary canal, especially undue acidity, undigested food, flatus, scybala.

A fourth source of excitement is that of the atmospheric air itself, and especially of the north, east, or north-east winds; and perhaps certain vapours, or the exhalations in certain localities.

The influence of certain states of the external atmosphere is probably exerted on the incident nerves of the larynx itself, which are thus excited, so as to induce, through reflex action, partial or complete closure of that organ. How important, then, is it to protect the susceptible little patient from an influence so fraught with danger!

With this influence of inspired air may be compared that of water, or other fluids, given to drink.

It is especially in this manner that the cold, dry air of the north-east wind, or the cold, damp air of certain localities, inspired, or cold fluids taken into the pharynx, may act in inducing laryngismus, especially in the cases of undue susceptibility, whether hereditary or induced, which obtains in this malady.

It is precisely what is observed in *choking* from any cause. I know a patient in whom the larynx and pharynx are so excitable, that, for a long time, he has been unable to swallow cold water, or use even warm water, as a gargle, without laryngismus. A drop of water, or a particle of bread, falling on the rima glottidis, produces a precisely similar, but more severe, effect in all—i. e. laryngismus, or even laryngismus stridulus.

The north or east wind, a cold and damp atmosphere, certain vapours in the atmosphere, &c. act on the unduly susceptible incident laryngeal branches of the pneumogastric nerve, and induce its *closure* by reflex action; the dashing of cold water on the face acts on the trifacial nerve, with which are mysteriously associated, in action, the muscles which *open* that organ. How perilous, under such circumstances, the attempt to give the little infant *any thing* to swallow!

Mr. Barlow observes—"I have seen four cases in which drinking brought on the paroxysm. Hot or cold fluid was more excitant than lukewarm. In one instance, the last and fatal attack was induced in this manner; in previous attacks there had been crowing; in this, the glottis seems to have been instantly closed, and convulsions and death speedily followed. In another, I observed that the attack was induced by sleep, excitement, pleasure, vexation, or the act of swallowing."

I have watched the effects of these causes, singly and combined, too carefully, to doubt that they may, severally or together, produce or renew convulsive affections in infants. It is difficult to determine the specific action of each; but certainly, whilst strabismus, or the spasmodic contraction of the hand or foot, may arise from teething, and from gastric or

intestinal irritation, the condition of the larynx is very apt to be affected by the north-east winds, or other conditions of the atmosphere, and the sphincters by the contents of the rectum and perhaps of the bladder.

A little experience will teach us, in a case so involved in obscurity and doubt as to the individual cause, most carefully to avoid *all;* this conclusion is of the greatest moment in practice.

I think it highly probable, fifthly, that the occurrence of this convulsive affection may become associated with an augmented excitability of the spinal centre. This may be viewed as the proximate cause of the disease; the others of which I have just been treating being its exciting and remote causes. It is from this cause that the attacks are apt to be reproduced by causes too slight to produce such an effect originally. Hence, the modes of treatment found to be beneficial should be continued carefully, *long* after the little patient *appears* to be well. This caution I also regard to be of great practical importance.

§ 5. *The Influence of Sleep.*

The condition of the nervous system, during sleeep, is peculiar. It is not unallied to epilepsy, and hence it often passes into epilepsy, and especially into convulsive affection in infants. The influence of volition being withdrawn, or nearly so, the muscles of the neck and larynx, like the orbicularis, contract on the venous system distributed in the neck, and the breathing becomes audible; it also ceases to be rhythmic; and, during its first and deeper stage, attacks of laryngismus, or other forms of convulsive disease, in infants, as epilepsy in adults, are apt to occur.

In deep sleep, there is a low degree of laryngismus even, manifested by stertor or snoring.

During sleep, the nervous centres are congested. If we open the eye, the conjunctiva is often observed to be deeply suffused.

In this condition of the circulation, we need not feel surprised if undue excitability occur, and that a dream, or an excitant of reflex action, may add to the peculiar condition

of the larynx and of respiration, which I have described, that which constitutes actual laryngismus, stridulous or extreme.

I have been conscious of interrupting a noise made during sleep, in the moment of awaking, which I could by no means imitate by an act of volition when awake. These are spinal acts, different from all voluntary efforts.

§ 6. *Cerebral Disease.*

I have already stated, that no disease of the cerebrum, limited in its effects to this organ, can induce convulsive affection; for no irritation of the cerebral substance can produce muscular contraction.

It is only when, by its locality, it can irritate the membranes, the incident or motor nerves, or the medulla oblongata; or when, by its magnitude, it can produce compression of that medulla, that it can produce such effect.

Inflammation, or tubercular granulation or tumour, with serous effusion at the base of the brain, may act in the former manner; and effusion into the ventricles, or inflammation, or congestion, in the substance of the cerebrum, may act in the latter.

One source of congestion is the violent fits of cough in pertussis; another is equally the cause and result of general convulsion.

In all these cases, the cause of convulsion resides within the cranium, and our attention must be directed to subdue morbid action in this cavity.

§ 7. *Excited Reflex Actions.*

In by far the greater number of cases, the symptoms of convulsive affection are reflex actions. As stammering would scarcely exist without emotion, so laryngismus, for example, is most effectually avoided by avoiding *every* exciting cause of reflex action. These causes are, as I have already stated, principally *four*:—

1. The irritation of the *trifacial* nerve in the gums and alveolar processes in dentition.

2. The irritation of the *pneumogastric* nerve by indigestible matters in the stomach.

3. The irritation of *spinal* nerves from morbid contents of the intestines.

4. The influence of the external atmosphere, under certain circumstances, on the incident branches of the pneumogastric nerve of the larynx, &c.

The influence of all these causes of reflex action is more or less *continuous;* and hence arises a peculiarity in their effects, which are more or less persistent. The strabismus, though not absolutely constant, frequently continues for a considerable period; and the cheirismus and podismus are apt to assume a tetanoid character.

Some of the symptoms are, indeed, transient in their duration, as the laryngismus. This difference is explained on the principle of interference; the acts of respiration interfere with the tendency to closure of the larynx; at this age, volition only slightly interferes with the closure of the fingers or toes; the laryngismus is therefore less permanent than the cheirismus or podismus; but when the laryngismus *is* continuous, it induces a fatal asphyxia.

The convulsive affection would also seem to wear out the excitability of the spinal system—as is seen distinctly in certain experiments—and so to cease, although the exciting cause may not be removed, and no principle of interference exists.

Such being the character of these reflex actions, it is extremely interesting to observe what are the precise organs affected. These are precisely those which are bound, as it were, by the chain of special incident and reflex nerves with the spinal centre, and constitute the spinal system. The larynx, the sphincters, are special examples of this fact; as are, I believe, certain symptoms connected with the gall-ducts. The morbid actions of the muscles of the eye-ball, of the fingers, of the toes, and, in the general convulsion, of the countenance, and of the general frame, obviously point out the special part of the nervous system first and specially affected, and the mode and character of the affection.

But most of all, our attention is riveted to that most important and vital part of the spinal system, the *medulla oblongata*, and its associated organ the *larynx!*

I appeal to my fellow-members of this Society, whether

we were prepared to pursue the investigation of this momentous subject, before the recent views of the spinal system, and its associated incident and reflex nerves with their spinal centre, and with their excito-motor and reflex modes of action, were laid before the profession? Whereas now, a case of convulsive disease, whatever its seat and form, is as intelligible to us as the simplest and best-devised experiment, possessing the additional and almost tragic interest of an experiment, replete with a thousand dangers, on a human being, the object of the keenest affections, hopes, and fears!

I must now add that this malady has sometimes appeared to affect other branches of the pneumogastric nerve besides the laryngeal—viz. the bronchial, and the branches distributed to the minutest branches of the air-cells, the gastric, the hepatic, and the nephritic, inducing peculiar effects. These effects have not hitherto been duly traced. But I beg to call the attention of the members of this Society to the interesting topic. Bronchitic, gastric, hepatic, and renal symptoms, frequently form a part of this convulsive affection: the flow of bile is arrested; the urine is frequently affected with a deposit of the lithates. Are these cause or effect, or independent of the other phenomena?

Through this labyrinth, the knowledge we now possess of the spinal system can alone guide us. Like the stethoscope, it enables us to apply another, and, in this instance, a new and intellectual sense, to the investigation and diagnosis of disease.

§ 8. *Of* Laryngismus *specially.*

Without closure of the larynx—extreme laryngismus, and the consequent congestion of the nervous centres—there could, I believe, be no general convulsion! This closure of the larynx must be complete, in the affection under consideration, as in all others, before convulsion *can* take place. Hence I have known the actual convulsion long warded off, by constantly and carefully watching the little patient, and whenever laryngismus was threatened, dashing cold water on the face. In this manner, too, the late Dr. Denman prevented the accession of puerperal convulsions in a case of the deepest interest, of which the details are given in his valuable work.

In pertussis, there is no convulsion, however violent the fits of coughing, until extreme laryngismus or closure of the larynx occurs.

In bronchitis, and in asthma, there is no convulsion, because there is no *laryngismus*.

Laryngismus is the efficient cause of convulsion in epilepsy. It is the first link in the fearful chain of symptoms in this fearful malady. To Mr. Barlow I am indebted for the details of a case of epilepsy, in which the extreme laryngismus and closure of the larynx was preceded by stridulous laryngismus, precisely similar to the crowing inspiration of infants.

It is laryngismus which destroys the patient in hydrophobia.

It is laryngismus which destroys the patient in the case of poisoning with strychnine.

In tetanus, it is *pharyngismus* perhaps, rather than laryngismus, which distresses the patient.

The extent of the fearful influence of laryngismus in disease has not been appreciated in or by the profession. It is laryngismus which proves the cause of sudden death—which has occasionally induced dismay in the practitioner, and unjust reflections on the part of the patient's friends—in cynanche tonsillaris, and in scarlatina anginosa.

It was by merely witnessing the phenomena of strangulation in hydrophobia, that the late Dr. Physick, of Philadelphia, was induced to suggest the operation of tracheotomy in this dire malady—a suggestion full of promise, if, indeed, there be hope at all in this disease*.

Juster views of the pathology of epilepsy will at least prevent us from attempting to give anything, far less any irritant or excitant, as cold water, or sal volatile, in the fit of epilepsy. In epilepsy, as in the crowing inspiration of infants, extreme laryngismus may be the cause of sudden death. When this does occur, it may be induced by the attempt to give even cold water. Mr. Barlow was recently informed of such a fatal event, arising from this very cause, acting in this very manner, in the case of a little patient on his list at the Infirmary for Children.

* See the Life of P. S. Physick, M.D., by J. Randolph, M.D. &c. 1839; page 58.

I believe a tube worn in the trachea would render the attack of epilepsy—that is, the epileptic *convulsion*, impossible! Extraordinary idea!

The acts of inspiration tend to empty the venous system of the nervous centres; an ineffectual attempt at expiration, the larynx being closed, fills it doubly.

Epilepsy is *cerebral* and *spinal;* in the former, there is loss of consciousness; it may be mere momentary oblivion: in the latter, there are perverted spinal acts: in the former, there is compression of the veins; in the latter, closure of the larynx, as a cause: it is in this way that the opened trachea would prevent the paroxysms. In choaking, it is laryngismus which is the source of danger. We all remember the interesting and instructive case of Mr. Brunel.

I propose to myself this subject of laryngismus as that of a distinct essay.

§ 9. *Emotion; Passion.*

Many facts lead to the conclusion that emotion and passion *act*, not through the cerebral system of nerves, but through the spinal and ganglionic systems. Hence these affections of the infantile mind are the frequent cause of various convulsive affections, and especially of strabismus and laryngismus.

Hence, too, the importance of procuring a judicious, careful, and patient nurse, of excellent temper herself, and able to maintain a state of mental tranquillity in her little charge.

I have frequently observed a momentary strabismus when an infant is brought into the room—the effect of emotion—which ceased soon afterwards.

Under the same or similar circumstances, a momentary laryngismus also not unfrequently occurs.

External noises, disturbance of any kind, fretfulness and passion, however induced, are the frequent causes of strabismus, or of laryngismus—this latter sometimes, in its severest form, attended by asphyxia, and not free from danger.

The fear of this is the true and real objection to the use of the gum-lancet; otherwise there is *none*. The question must be resolved, in each individual case, by carefully watching its effects. I have often thought, that a ther-

mometer might be employed to determine the condition of the dental circulation, and that a lancet might be concealed, in a ring, or so as to have none of the formidable appearance of the ordinary gum-lancet.

But the objection which applies to lancing and scarification of the gums, applies with equal force to the administration of medicine, enemata, and almost every kind of remedy.

There is ample scope in such cases for the judgment of the physician. The infantile mind must be cared for as well as the body; and whilst every cause of reflex action is carefully removed, every source of mental fret and irritation should be as carefully avoided.

It is at the moment of awaking, especially, that these precautions are most required. It is on awaking that every source of surprise, every noise, every cause of excitement, should be specially avoided; for it is at this moment of repaired excitability that spasmodic or convulsive movements are most apt to be excited.

The important and extensive influence of emotion in exciting disease or its paroxysms, is still untraced. Amongst mental causes, it is emotion which induces insanity; it is not, for instance, the calculations, but the hopes and fears, of the speculator, which derange his reasoning faculty, and set imagination at fault. The paralysis agitans is induced originally, and throughout its course, by emotion. What an interesting topic for investigation!

§ 10. *Convulsion; Asphyxia.*

In the actual convulsion, the larynx is closed, and there is a forcible effort of expiration, the respiration being suspended; and there are violent actions of the muscular system—of the eyes, face, and general frame.

These muscular actions are rarely equal on the two sides of the mesial plane, and therefore the eyes, countenance, and general frame, are greatly distorted, and the aspect of the little patient is frightful.

The venous system of the head and face is greatly distended (in epilepsy, in the adult, I have known this condition issue in ecchymosed spots), and the countenance appears tumid and livid. The eyes, the lips, the tongue, and doubt-

less the venous and capillary systems of the cerebrum, the thymus gland, &c. partake of the same condition.

The aspect of the countenance is very different, according as the attack assumes the character of convulsion, or that of asphyxia; in the former, it is livid and purple, with distension of the veins on the temple and forehead, and of the capillaries; in the latter, it is livid and pallid, and cold and clammy.

These two conditions should be carefully distinguished, though they are doubtless more or less combined in every case.

The violent convulsion leaves a state of congestion of the cerebrum, with the danger of effusion, or actual effusion.

The state of asphyxia leaves the blood deteriorated, with the danger of asphyxia of a *secondary* kind.

§ 11. *Augmented Excitability, or Spinal Erethismus.*

I will take the liberty of detaining the Society a few minutes, whilst I state a few facts on the subject of augmented excitability in the nervous centre, in a certain class of diseases.

If a mild voltaic current be made to pass through the denuded and insulated spinal marrow, or lumbar nerves, in the frog, for ten or twenty minutes, and then be withdrawn, the lower limbs are thrown into a state of tetanoid spasm. This condition of the nervous centre, or muscular nerve, I have designated the *electrogenic*.

If, instead of affecting the nervous tissue in this manner, we place the frog in a dilute solution of strychnine for a similar period, the spinal marrow being divided near the occiput, we have again a tetanoid condition of the limbs.

These two tetanoid conditions are not, however, the *same*, or even similar: the first is permanent, and requires for its manifestation no excitant; the second is one of predisposition only, and exists only when induced by some external exciting cause; in the former, the electrogenic state is the excitant; in the latter, the strychnogenic condition, if I may use this term, is not an actual excitant, but only one of induced augmented susceptibility to other excitants.

I believe these two conditions exist in certain peculiar states of disease in the human subject, of which they are, therefore, the appropriate *types*; spinal arachnitis, a spicula

of bone irritating the spinal marrow, produces effects similar to the former; a lacerated cutaneous nerve (inducing tetanus), and a poisoned state of the blood (in hydrophobia), produce a condition similar to the latter.

All this is a deduction from experiment; I commend it to the attention of my brethren in the profession.

I now return to the subject of convulsive affections in infants.

The spinal centre becomes so excitable in some of the cases of this convulsive affection, that causes which have no influence, or no injurious influence, in health, produce marked effects in the course of this malady.

I have already observed that the little patient, on being brought into the room in which the physician, a stranger, is waiting, generally or frequently manifests the effects of the slight emotion induced, in a transient strabismus or laryngismus. The slightest fret of mind, or sudden start, produces a similar effect.

A mere change of room, or of locality, or of the direction of the wind, will often renew the malady, even when it has ceased for a time. On the other hand, "air and exercise" are the great antidotes to augmented excitability. Change of air, free exposure to the air when the weather is fine, are as essential as security against its inclemencies.

During the progress of dentition, it frequently happens that repeated attacks of this affection, in its varied forms, are experienced. It is, therefore, apt to be protracted through many months, indeed until dentition is completed.

I fear that this excited condition may be protracted even through future years, and that the convulsive affection of the infant may lead to epilepsy in the adult. Fearful idea! The attacks of this very epilepsy frequently begin with a species of laryngismus—an actual closure of the larynx,—and proceeds in its own manner to produce the general convulsion, and the other formidable effects of this dire malady.

It is singular enough, and the idea that this laryngismus belongs to a peculiar nervous organ cannot be repeated too often, that, in the excitability induced by strychnine, it is a species of laryngismus which is the peculiar symptom, when its effects are severe or fatal in the human subject, or in the

warm-blooded animal. In the extreme case, it is, as in extreme laryngismus, instant or speedy asphyxia.

This laryngismus, so far from being peculiar as an affection of infants, is, as I have already stated, common to a whole class of affections of the true spinal system: emotion, hysteria, epilepsy, strychnogenic tetanus, hydrophobia; one and all affect the larynx—and the medulla oblongata—especially; one and all produce a state of varied laryngismus. This affection of the larynx, therefore, instead of being a disease, or a symptom of disease, is a symptom denoting an affection of a certain nervous *system.*

The true idea of the morbid affection under consideration, as of tetanus itself, is that of an excitant or excitants, which first induce a state of augmented spinal excitability, or *erethismus;* then, various excited reflex actions; and thirdly, general convulsive affection.

Tetanus and hydrophobia consist in an induced spinal erethismus, the paroxysms consisting of augmented or excited spasm, from external excitants.

The infant under the influence of what I will designate the convulsive tendency, susceptibility, or erethismus, may therefore be *compared* to the patient affected by tetanus. The causes are similar,—irritated nerve, inducing spinal erethismus, and great susceptibility to excited reflex actions; the effects are analogous—tetanoid affections. The *difference* is in the absence or presence of laryngismus.

Not dissimilar is the state of things in the augmented excitability which is induced by strychnine, and which occurs in hydrophobia.

In the infantile disease, as in tetanus, the augmented susceptibility, or spinal erethismus, is indeed induced through irritated *nerve;* whilst in the effects of strychnine, as in hydrophobia, it is induced by a poison in the *blood* itself— an important distinction in the pathology of this class of diseases, first pointed out in my New Memoir, published—if, indeed, it can be said to be published—in 1844. In both sets of cases, the disease consists in an induced augmented excitability of the spinal marrow, or *spinal erethismus,* whilst its paroxysms are the result of excited reflex action, until we arrive at general convulsive affection.

§ 12. *Effect on the Cerebrum.*

There is a *cerebral form* of this disease; the child lets its head, or head and trunk, *fall;* it is of momentary duration. But in other cases the head is drawn down suddenly and with violence, so as, for example, to break the window, if the little patient were near it. This has been termed the *salaam* convulsion. In one case the little patient falls backwards.

Let actual convulsion once occur, and all is changed and complicated. It is no longer the spinal system only which is affected; the cerebrum has become congested, and effusion is threatened; and now double care is required to prevent the wreck of intellect or of limb, from the influence of pressure, or of counter-pressure, of the organ of mind itself, or of the tissues occupying the base of the cranium—the membranes, the trifacial and pneumogastric nerves, the medulla oblongata.

What a study for the physician enlightened by physiology! How extensive, how complicated! How are we to be guided through this labyrinth? By experiment. The tissues, to which I have referred, must be irritated and compressed, one by one, and the respective effects noted with the utmost care and attention; and the results must then be compared with the events witnessed in actual practice.

We may imagine what is the precise condition of the brain and of the medulla oblongata, and indeed of the interior circulation generally, by carefully observing the congested state of the veins, and of the capillary vessels of the *face*.

We should also carefully examine the condition of the *bregma*, or fontanelle: it is concave, plane, or convex, affording an index to the condition of the circulation, or it may be effusion, within the cranium.

§ 13. *Sudden Dissolution.*

Sudden death may take us by surprise at *any* period of convulsive disease.

This event may be of two kinds: the first is asphyxia, from extreme laryngismus; the second is what I have designated secondary asphyxia, and probably arises from the circulation of blood imperfectly arterialized in the coronary arteries.

Extreme laryngismus may occur quite unexpectedly amongst the first symptoms, or in the midst of such general convulsive affection as may have repeatedly taken place and passed off without such apparent danger. If but a slight strabismus, or a slight contraction of the finger, remain; or even if all symptoms have entirely disappeared, fatal laryngismus may still occur, taking us by surprise, all having appeared well and safe.

I do not think we have any means of judging *when* this event is more likely to take place than usual.

Our prognosis, therefore, however justly tinctured with hope, should always be most guarded in this class of maladies; otherwise our judgment will assuredly be sometimes painfully called into question.

The prevalence of a north-east wind appears particularly apt to induce laryngismus in its extreme form; and in this manner several cases of sudden death have occurred in practice nearly at the same period of time.

A fit of passion is frequently the immediate cause of closure of the larynx, and of dissolution. And though I never knew so disastrous an event to occur, I have often feared lest it might take place during the use of the gum-lancet; and it is precisely the real danger of exciting a paroxysm of convulsive affection, which is the real, and I may add, the sole, objection to the use of this important remedy.

In reference to such an event, Capuron remarks:—"L'enfant a été réellement suffoqué." Dr. Johnson, of Dublin, saw "a child in a state of asphyxia, caused by this disease, recovered from apparent death by the instantaneous application of artificial respiration."

In the case of threatening of asphyxia, the remedy is—*instantly* to dash cold water on the face and other parts of the general surface. The further treatment, in general, is that for *asphyxia*, especially the institution of artificial respiration. The thorax and abdomen should be speedily compressed, and then be left to the force of resilience, in order that inspiration, however slight, may follow. Frictions of the limbs, with pressure, directed upwards, should be used energetically.

The douche, the attempt at artificial respiration, the fric-

tions, should be repeated and pursued, however apparently ineffectual, with *perseverance*.

Tracheotomy was suggested by Dr. Hugh Ley, and it was successfully performed by Dr. Johnson in this emergency. On learning this afterwards, Dr. Ley added the following note:—

"I have made no essential alteration in my statement, that the grounds upon which I was originally disposed to advocate the propriety of the operation may remain upon record, and as a proof of the value of well-conducted physiological experiments in illustrating pathological facts, and suggesting remedial expedients. It is a reply to the maudlin sensibility, with regard to such experiments, too prevalent at the present time."—*On Laryngismus Stridulus*, p. 273.

The case of sudden death, in this class of maladies, is, however, not always mere laryngeal asphyxia. It is sometimes, as I have already stated, of that kind which may be termed secondary, or *cardiac*, asphyxia—a condition which arises from the frequent partial closure of the larynx, and consequent partial asphyxia. The blood is then not sufficiently oxygenated or decarbonized; and, as in *all* morbid conditions of the *blood*, there may be still more sudden death than in the most extreme forms of laryngismus. The poisoned blood acts on the fibres of the heart, destroying their irritability. Death is instantaneous; and, I fear, there is neither time nor hope for remedies. Arrested respiration leaves a few minutes; arrested circulation, scarcely a moment.

Sir Benjamin Brodie mentioned a case to me in which sudden death had occurred in a case of tetanus, after all tetanic symptoms had disappeared. The patient had been in a bath, and was dressing, saying that he was quite well! What was the rationale of this sudden event? Was it exhausted excitability? Does the same principle hold in the convulsive diseases of infants? If so, a third cause of sudden dissolution must be recognized.

As I have already remarked, the distinction of the spinal system is, to diseases of the nervous system generally, what the Stethoscope is to diseases of the circulating and pulmonary systems,—the effectual means of the DIAGNOSIS.

§ 14. *The Diagnosis.*

The diagnosis in the convulsive diseases of children is—

1. That of the kind or *origin* of the disease, and especially that between the *centric* and *ex-centric* affection.

2. That of the *form* of the disease, and especially that of the different, partial, and general convulsive affections; for it may be so partial as to consist of one symptom only, as strabismus, or laryngismus, or it may be general, and frightfully convulse every part of the muscular system.

In the *centric* affection, there are generally pain, and cerebral symptoms, such as affections of the sleep, temper, and senses—wakefulness, fretfulness,—intolerance of light and noise,—and a peculiar contraction of the brow—from the beginning.

In the *ex-centric* affection, there is, at the first, no cerebral symptom; all the phenomena are spinal: general convulsion must take place before cerebral symptoms are observed.

The diagnosis between that part of this affection designated laryngismus, and laryngitis, is founded on two circumstances: 1, the transitory, remittent, or intermittent, character of the symptoms in the former, and its permanency in the latter; and 2, the complication of the former with strabismus, cheirismus, and other convulsive or spasmodic affection, and the entire absence of these in the latter.

The same principles of diagnosis distinguish spasmodic laryngismus from any paralytic influence of compression of the pneumogastric nerve on the larynx; in which case there may also be other effects of paralysis of the pneumogastric nerve, especially accumulated secretion in the bronchial tubes and pulmonary tissue, leading to cough and various "*râles.*" The reality and the accurate diagnosis of this latter form of disease are still to be ascertained.

Laryngismus induced by bronchitis or any inflammatory affection of the trachea or larynx acting as an irritant on the incident laryngeal nerves, would probably be distinguished by the same absence of other spasmodic affection.

§ 15. *Post-mortem Appearances.*

The post-mortem appearances depend entirely on the nature and course of the disease.

If the case be one of those rare instances of affection of the cerebrum or its membranes, leading to irritation or compression of the medulla oblongata, intra-cranial incident nerves, or the membranes in which certain of these are imbedded, the morbid appearances will be such as are usually found in these cases.

Granular tubercles in the arachnoid, especially at the base of the brain; effusion into the ventricles; tubercles in the lungs, &c. enlarged cervical and bronchial glands; are apt to be found in the *same* case.

In one case the medulla oblongata was distinctly indurated. It was a case of laryngismus.

If there have been repeated violent convulsions, or fits of pertussis, we shall perceive cerebral congestion or effusion, and with this probably tumefaction of the *thymus* gland.

But in those cases in which no repeated general convulsions had occurred, and in which the little patient had died suddenly perhaps, no marked appearances of the nervous centres may be detectible. The disease in this respect, as in so many others, resembles asphyxia, or tetanus.

The condition of the gums and alveolæ, of the stomach, of the intestines, of the lungs, the liver, the kidneys, should be carefully examined; but of the morbid appearances in these nothing is known.

§ 16. *The Prognosis.*

I have been accustomed to say that, if we attend to *all* the causes of this affection early and efficiently, the patient certainly recovers. But it must be admitted that it is only through great danger, and by very steady perseverance, that our little patient is really made safe.

Besides, the case of centric convulsive affection, induced or attended by cerebral affection, whether primary or secondary, is but too generally fatal.

In the ex-centric cases, the great question is—Has actual convulsion occurred? If so, the danger is tenfold greater than if no extreme laryngismus or consequent general convulsion have existed.

In all cases, too, the degree of hope and security is in proportion to the attention and perseverance with which the

precautions and remedies are administered; and some parents often tire of the continued effort required. I have adverted to the case of a family in which the children became successively and fatally affected by this malady. The next succeeding patient recovered under the discipline to be described hereafter. The case was published in THE LANCET. But another case occurred. The parents recoiled from the sustained effort necessary, and I know not what became of the little patient.

Mankind are much more disposed to place an implicit but superstitious trust in some remedy, recommended with mystery and authority, than to use their *own* good sense, and avoid *every* exciting cause and employ *every* means of cure with understanding.

The public, and, not less, the soi-disant "practical man," have a mean and derogatory idea of the real Art of Medicine.

But, in the midst of the best-devised and best-administered plans of treatment, an accidental exposure or excitement of the little patient,—a sudden startling noise, the effort to resist medicine or other remedy, the act of swallowing food even, or a sudden exposure to the air, may induce the attack, which may assume the form of extreme laryngismus, and prove suddenly, and at the moment, and in the individual case, unexpectedly fatal!

§ 17. *Prevention and Treatment.*

I now come to the last and most important topic of my paper—the prevention and treatment of convulsive diseases; to which, indeed, the views which have been given immediately lead, and in the course of which they serve as a torch to enlighten our path.

The first thing to be accomplished by the physician, as in all other cases in practice, is a full and accurate diagnosis of the disease, its form, its simplicity, or complexity; its effects; and especially whether there has or has not occurred general convulsion.

If the case be one of centric origin, which is the more rare, the original disease must, of course, be treated energetically. If it be of ex-centric origin, or reflex, which is by far the

more frequent case, the excitant or excitants, whatever these may be, must be carefully sought out, removed, and avoided.

But, *as a rule*, in *all* cases, the influence of *all* excitants, *all* excitants of emotion and of reflex action, must be absolutely removed. For, even in the centric affection, it may be undue excitability only which is induced, and the *attacks* may depend upon external excitants.

The augmented arterial action within the gums and the alveolar processes must be subdued by deep, diffused, and repeated scarification of the gums, conducted with every precaution, to avoid excitement of a mental kind.

The stomach should be emptied forthwith. This may frequently be readily done by irritating the fauces with a feather, or the finger; or a dose of ipecacuanha may be given; and then such diet should be administered, according to such rules, as may prevent the presence and delay of undigested matters in the stomach. A new and healthy nurse, and asses' milk given by means of the bottle, are resources of the utmost moment.

The intestines should be promptly washed out by means of ample enemata of tepid water, and they should then be kept well relieved, gently free indeed, by means of mild but efficient, aperient medicine.

I have great reason to suspect the existence of undue *acidity*, not only in the stomach, but in the course of the intestinal tube, in these cases; and I strongly recommend *antacid* aperients, such as a combination of the bicarbonate of potassa, and the carbonate of magnesia, in the proportion of one-fourth and three-fourths, in some proper aromatic or aperient vehicle, and repeated so as to produce the double effect of neutralizing the gastric acid and moving the bowels.

The next object is, to guard the little patient against every injurious impression from the external atmosphere. When the north-east winds prevail, or the air is cold or damp, the patient's bed should be surrounded, at intervals of about one foot, by *three* distinct curtains or tents of gauze, or of net; the air of the room should be protected from partial currents, be well supplied with hygrometric moisture, and be maintained at a temperature of 65° Fahr.

Every mental disturbance must be avoided; the approach of a stranger, the administration of the gum-lancet, and, not less, of medicine or other remedies, must be managed as carefully as possible.

The *sleep* should be *watched;* if it be disturbed by dreaming or starting, the infant should be gently awakened, and any sudden noise or light should be avoided; precautions necessary, indeed, at all times.

As stammering would scarcely exist without emotion, so the convulsive diseases of infants and children, especially those of ex-centric origin, would scarcely exist without emotion and excitants of reflex action—an aphorism of the utmost moment in practice, and admitting of great extension; for, in this respect, with the affection under consideration, chorea, the paralysis agitans, tetanus, and even hydrophobia itself, may be ranked, in some degree.

If laryngismus should exist and be extreme, the larynx being closed, water must be forcibly sprinkled on the face: the larynx is opened by the new excitant acting on other nerves and muscles, and inspiration is excited.

If apparent asphyxia have taken place, and this measure have been tried in vain, artificial respiration should be attempted; the chest and abdomen should be compressed, and the pressure should be suddenly removed. (I once witnessed asphyxia from this cause in a puppy. I applied my ear so as to examine the beat of the heart; the pressure induced expiration, and inspiration followed on its removal, and the puppy recovered.) Or the lips of the practitioner should be applied to the mouth of the infant, whilst its nostrils are closed and its trachea pressed against the œsophagus: in a word, every measure should be adopted to which we have recourse in other cases of asphyxia.

If general convulsion be threatened, or have occurred, every precaution and measure should be adopted which can protect the cerebrum from congestion and its effects: the alcoholic lotion applied to the head, leeches, cupping, mercurials, and purgative medicines, fomentations and warmth applied to the feet, &c. must all be employed with promptitude and energy.

The secretions must be attended to—the bile, the urine,

especially. If the former be deficient, the use of warm water enemata should be doubly enforced. If the urine be affected with lithate deposits, the antacid aperients must be doubly enjoined.

The hydrocyanic acid, hyoscyamus, &c. may also prove useful in subduing undue excitability.

§ 18. *Conclusion.*

It remains to treat of the convulsive affections which occur in utero, about the period of puberty, in adult age, in the puerperal state,—periods of human existence at which peculiar degrees of excitement and peculiar excitations occur, psychical and physical, not hitherto traced by the physiologist, who alone deserves the name of the physician.

In the fœtus we have the highest degree of excitability of the nervous, and irritability of the muscular, systems, with the least degree of stimulus,—respiration and food; at birth, the fœtus assumes the character of infantile life—it becomes an air-breather—but still its food is of the least stimulant kind, and its own respiration will not sustain its temperature—its excitability is therefore high; at puberty, special emotion and a special excitability come into play; in adult age, convulsions arise more from augmented stimulus than from extreme excitability, as we observe in certain forms of epilepsy and puerperal convulsion. All this accords with the THEORY of an inverse ratio between the dynamics and stimuli in the animal œconomy, the application of which to pathology still requires to be made. But these topics must be reserved for another occasion.

And now, Sir, I beg to draw this paper to its conclusion. If I have, in the course of my observations, vindicated the importance and necessity of physiology—experimental physiology—to the practical physician; if I have shown the value of the recent investigations into the nervous system, in the investigation, diagnosis, and treatment of diseases, I have fully attained the object which I had proposed to myself, in bringing this paper before you and my fellow members of this Society; and I beg to thank you for your kind attention to its rather lengthy details.

ESSAY II.

ON

THE THEORY OF CONVULSIVE DISEASES IN ADULTS, AND ESPECIALLY OF EPILEPSY;

Being an Essay read before the Medical Society of London, October 25th, 1847.

THE following sketch is presented to this Society as a further* specimen of what may be done in applying our recent knowledge of the spinal system to the theory and pathology of the diseases of the nervous system generally.

It is evident, that the whole subject of the diseases of the nervous system requires to be observed and studied anew, with this fresh knowledge of its physiology and pathology, as the Ariadne's web to guide us through the labyrinth.

In this paper I have ventured to employ the term THEORY, hoping to restore it, in its good and legitimate sense, to medicine, still believing that the science of the physician deserves the name of science. The theory of diseases is, in reality, based on the investigation of the structure and functions of the animal frame, and their aberrations arising from the influence of external and internal agents,—on careful observation,—and on legitimate induction.

I have been much struck with the just and forcible remarks of Archbishop Whately, who observes: "With respect to experience—which has been made the subject of so much fallacy, by a careless and inaccurate mode of appealing to it," —it is, "in its original and strict sense, applicable to the *premises* from which we argue, not to the *inferences* we draw;"

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* See p. 11, and THE LANCET for June 12th, 1847, p. 609.

and "the *experience* of *practical* men is often appealed to in opposition to those who are called *theorists*, even though the latter, perhaps, are deducing conclusions from a wide induction of facts, while the experience of the others will often be found only to amount to their having been long conversant with the details of office, and having all that time gone on in a certain beaten track, from which they never tried, or witnessed, or even imagined a deviation;" and again, "when you find any one *contrasting* what he calls experience with theory, you will usually perceive, on attentive examination, that he is, in reality, comparing the results of a *confined* with that of a *wider* experience—a more imperfect and crude theory with one cautiously framed, and based on a more copious induction*."

It is humiliating to observe the public—and the profession, too—so prone to regard medicine as forming no part of the liberal sciences, but as a mere empirical art, or a sordid profession. It *is*, in reality, and at once, as Cuvier has eloquently described it, "la plus étendue des sciences, la plus utile des arts, et l'état le plus digne d'un homme dont le cœur est animé de l'amour de ces semblables†."

In the public mind, medicine is still but the empirical discovery of *a* remedy for *a* disease. Formerly, the object of some of its visionary professors was the discovery of a universal remedy—that is, *a* remedy for *all* diseases. The real object of medicine, as an art, is the just and rational application, in each and every case, of ALL our measures of prevention, mitigation, and cure, whether these be deduced from experimental or scientific considerations. The mere "practical" physician, as some have boasted themselves to be, is the deluded and deluding alchymist of our profession; he may pretend to *cure* diseases, as his prototype pretended to commute the baser metals into gold; and the world is not less credulous now than it was then. The true physician resembles the scientific chemist in his pursuit of a legitimate science, and in its application to a noble art and the prosecution of an honourable profession.

But I hasten to the special object of my paper.

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* Lectures on Political Economy, pp. 64—68.

† Eloges Historiques, tome ii, p. 58.

§ 1. *Introductory Observations.*

Esquirol observes, in the commencement of his remarkable chapter on Epilepsy, "Les symptomes de l'épilepsie sont tellement extraordinaires, *tellement au dessus de toute explication physiologique ;* les causes de cette maladie sont tellement inconnues, que les anciens ont cru qu'elle dépendoit du courroux des dieux*." Nevertheless, it is precisely this explanation—this theory—of the epileptic seizure, which I am about to attempt in the following essay.

In treating of epilepsy, I view it as only one of many forms of convulsive disease. No forms of convulsive diseases differ more from epilepsy than the different forms of epilepsy differ amongst themselves. The two terms may therefore be regarded as synonymous, or generic.

Epilepsy, in all its forms, is essentially convulsive—that is, the *first* link of causes and effects, in this disease, is of that character. Now, the accurate experiments of M. Flourens have finally established the great physiological and pathological principle, that no physical irritation of the cerebrum or cerebellum, or of the purely cerebral nerves†, or indeed of *any* part of the nervous system, except the spinal marrow and the muscular nerves, *can* produce muscular action. To my own experiments and investigations we are indebted for the fact, that these effects of irritation of the spinal marrow may be induced or excited through certain incident excitor nerves, of which, indeed, *as such*, the idea did not previously exist in anatomy or physiology.

From all this it follows, that convulsion in general, and epilepsy in particular, must arise from *two* sets of causes—first, those which excite the spinal centre, comprising the medulla oblongata and medulla spinalis *immediately ;* and secondly, those which excite this organ through the *medium* of its incident nerves.

The first of these causes may consist of *any* disease having its seat within the cranium or spinal canal, *so* that it may occasion irritation of the spinal centre. The second consists of *any* disorder or disease which may irritate any part of the

* Des Maladies Mentales, tome i, p. 274.

† This last fact we owe to M. Magendie.

class of incident nerves of the spinal system, whether situated in the mucous or serous membranes, or other tissues or organs.

This irritation of the spinal centre, mediately, through the incident nerves, or immediately, by the actual contact of the cause of irritation, constitutes the first link of the chain of causes and effects or symptoms, in epilepsy, to which I have adverted. The second link in that chain is the convulsive contraction of a certain class or system of muscles. This system of muscles is as *special* as that of the muscles of inspiration or of deglutition, excited into action by an excitant of these several functions. In epilepsy, it is certain muscles of the neck (and perhaps I may specify the platysma myoides) which are so affected. The immediate consequence of this, and the *third* link in our chain, is a compression of the jugular and *other* large veins of this important region (the vertebral are indeed more *jugular* than the jugulars themselves), with congestion of the venous roots and capillary canals which lead to them, and of the cerebrum and other organs in which these are seated or take their origin.

Thus, as the first symptom of tetanus is a spasmodic affection of certain muscles of the pharynx, of the posterior part of the neck and of the inferior maxilla, so the first symptom of epilepsy consists in a spasmodic action of muscles, occupying, principally,—perhaps not entirely,—the anterior part of the neck, usually denominated the throat, speedily or immediately followed by a similar affection of the muscles which close the larynx, inducing the symptom which I shall designate laryngismus— so *analogous* are these two affections of the spinal system.

The state of things arising from compression of the jugular veins (principally) I beg to designate by the term of *sphagiasmus*, from the venæ or φλεβες σφαγιτες, Celsus, lib. iv. cap. 1. From this first symptom, when unfollowed by laryngismus, that form of epilepsy which may, from being apparently limited to cerebral symptoms, be designated cerebral epilepsy, arises. It is, then, the *petit mal* of the French. It is the first or cerebral part of that form of epilepsy, which, conjoining or superadding laryngismus or other violent convulsive affections, is the *haut mal* of the same authors, the ιερον γαρ το μεγα of Aretæus. In the former there is, or may be, every cerebral

symptom, as in this latter there is every spinal affection, however terrific.

Laryngismus may be either a partial closure of the larynx, and therefore stridulous, or the closure may be complete. In the latter case, it leads to general distortion and convulsion of the eyes, face, and general frame.

As a part of the epileptic seizure, of the most pathognomonic character, I must briefly notice another symptom, in this rapid enumeration of causes and effects in this malady: it is the *odaxismus*, or bitten tongue, lip, or cheek,—a term already in use in the older writers in a different sense, from ὀδαξέω.

Next in order is the general convulsion—of the eyes, face, and limbs, and next, the affection of the expulsors and sphincters.

Having given this preliminary sketch of the causes and pathology of epilepsy, I proceed to details. I beg first to observe, that this dire disease, with its congeneric affections, is but the anatomy and physiology of the spinal system, such as I have established it, converted into pathology and therapeutics; by which last term I mean, not the empirical cure, but the just and rational treatment of disease.

At the uppermost and lowest parts of the spinal marrow, there are, as I have said elsewhere, two special centres of the reflex spinal system, the medulla oblongata and its analogue. The first presides over the larynx, the pharynx, the muscles of respiration; the second, over the uterus, the expulsors, the sphincters.

These views do not apply to epilepsy alone, but to the *Class* of convulsive diseases.

Diseases of the reflex spinal system are found to involve and affect these organs and their functions, in a manner equally special and peculiar.

The knowledge of the anatomy and physiology of the system, is the diagnosis and our guide to the pathology and treatment of this class of diseases.

In all these diseases, the larynx, the pharynx, the respiration, the uterus, the sphincters; the organs, in a word, of ingestion and of egestion, of exclusion, of retention, are affected in a manner which is special and diagnostic.

But, of all these organs, the larynx, as it is the most imme-

diately vital, so its affections, its partial or complete closure, are attended with the most terrific consequences. The anatomy—the nervous and muscular relations; the physiology—the various reflex arcs and modes of action, of the larynx, constitute one of the most interesting subjects of inquiry for the physician; for, on a thousand occasions, this anatomy, this physiology, are his guides in practice, enabling him, as I have said, to form his diagnosis, teaching the pathology, and suggesting the proper treatment.

All this will be obvious from the details given in the following brief Essay. It will be still more so as I point out the condition of the larynx and of the tongue, the laryngismus and the odaxismus, in epilepsy; of the larynx in hydrophobia; and of the pharynx in tetanus; and as I trace the effects of emotion and of hysteria, of strangulation, of certain destructive agents, as strychnine, &c. on this *Class* of organs.

The resemblance between epilepsy and strangulation I have pointed out elsewhere. Besides the condition of the veins and larynx, that of the ejaculators, expulsors, and sphincters, is similar in both these cases.

§ 2. *The Causes.*

It was impossible to conceive any just idea of the causes of epilepsy, and of their modes of action, until we possessed a just view of the excito-motor system of nerves, and their functions. There existed vague notions, indeed, relative to idiopathic and symptomatic epilepsy; but there could be no distinct and accurate views of the excited, direct, and reflex, modes of action of its various causes, and of the relations of these to pathology.

The causes of the epileptic seizure may be divided into those which consist in—

1. Gastric, enteric, and uterine, and, probably, urinary, irritation; this form of epilepsy is *reflex*.

2. Irritation of the membranes within the cranium, and, perhaps, of some other cavities, as the pericardium; this form of epilepsy is also *reflex*.

3. Irritation of the medulla oblongata, in diseases seated within the cranium; this form of epilepsy is *direct*.

4. Shocks to the nervous system, and especially to the

medulla oblongata, from great emotion, as fright, from violent efforts, from sexual excesses, &c.; this form of epilepsy is also *direct.*

5. Sleep; in which there is, normally, a degree of sphagiasmus; and—

6. Causes of augmented and undue excitability of the spinal system, as that left by previous seizures, emotion, sexual excesses, interrupted sleep, &c.

7. I ought also to allude to certain perturbations of the system, as causes of the epileptic seizures, such as is observed in the first stage of variola.

8. It is also to be observed, that exhaustion from loss of blood is a cause of epileptic convulsion, especially in the erect position.

9. Epileptic seizures, also, frequently attend albuminuria and diabetes.

That gastric irritation is a cause of epilepsy, is proved by the well-known fact, that indiscretions in diet too frequently lead to its attack. I have especially known pork, and supper, to have this effect. I have treated other patients who have suffered from the epileptic seizure whenever they have been constipated, or disordered, or even fretted by drastic medicines. The urine is frequently observed to be affected with lithic acid deposits.

In other cases, the epileptic attacks have been distinctly induced by the uterine irritation attendant on the returns of the catamenial period, or on pregnancy: I need scarcely advert to the case of puerperal convulsion or epilepsy.

That tumours within the cranial cavity, however situated, irritating the membranes, and diseases of the membranes themselves, as ossification, induce epileptic attacks, is a conclusion which, whatever it wants in philosophic accuracy, we must draw from the records of experience, and the results of experiment.

Other diseases of the substance of the brain, or within the cranial cavity, act by their direct irritation of the medulla oblongata, or by similar irritation resulting from counter-pressure.

No form of epilepsy, as no form of disease in general, is more serious than that which results from fright, or other

violent emotion; and the physician has but too frequently to deplore the dire effects of sexual excesses in epileptic seizures.

There is something quite *specific* in many cases of convulsion. The *same* cause is required to produce the attack; it is thus that the convulsion of infants, arising from teething, cease when the process of dentition is completed. It is thus that previous epilepsy does not usually lead to puerperal convulsion.

This statement must be made, however, with due limitation: I think children affected with convulsion, and women affected with puerperal convulsion, are more or less liable to become the subjects of epilepsy.

In some cases, any one of a variety of causes will excite the epileptic paroxysm in the same patient.

Lastly, these causes, and epileptic seizures themselves, induce a morbidly augmented excitability of the spinal marrow. Emotion, effort, sexual excess, leave a susceptibility to impressions which is a malady in itself. I have known patients who, on the slightest exposure to circumstances of emotion or effort, became affected with epilepsy; as to sexual excesses, the act itself has been designated a μικρα επιληψια. We have only to imagine induced augmented excitability, and the symptom which I have designated sphagiasmus and laryngismus, and our idea of an epileptic seizure is complete. Lastly,—and I must treat of this subject a little at length,—I must notice—

1. *Sleep as a cause of epilepsy.*—Many have been the conjectures relative to the cause and nature of sleep. When I suggest that this cause is of the nature of sphagiasmus, the alliance between sleep and the epileptic seizure, so long observed by physicians, will be obvious enough.

As sleep approaches, the levator palpebræ—a muscle of voluntary motion—ceases to act; whilst the orbicularis—a muscle of true spinal action—contracts and closes the eyelids.

Imagine an event, similar in its nature, to take place in the muscles of the neck: volition ceasing, spinal action being energetic, certain muscles contract and compress the veins, and a degree of fulness of the neck and face, with turgidity of the eyes, is the obvious result; nay, there is even a degree of laryngismus heard in the respiration. All this is most

observed in the first deep sleep; and it is precisely this first sleep which is apt to pass into actual epilepsy!

Heberden, speaking of sleep, says, "Unum vidi qui se illo lædi putaret, ideoque moneret adstantes, ut eum excitarent, quoties eo tempore dormiturus videretur." Esquirol observes, "Je soigne un homme agé de trente-deux ans, dont l'épilepsie est compliquée de fureur et de démence. Il n'est pris de ses accès que pendant le sommeil. S'il arrive, ce qui est très rare, qu'il ait des accès pendant le jour, il s'endort immédiatement *avant;* si on s'oppose au sommeil, ou si on l'éveille à temps, l'accès est prévenu. J'ai conseillé au malade de ne pas se coucher, et de combattre le sommeil par la distraction: l'accès a manqué, mais le sommeil du lendemain a rappelé les accès.*"

It is at least obvious, that attention to the sleep—to avoid the supine position, supper, late hours, &c.—to watch it, and softly to interrupt it if too deep or disturbed—is most important.

To the influence of sleep, that of the recumbent posture may be added, in accounting for the frequent recurrence of the epileptic paroxysm during the early part of the night. Later in the course of the night, or early in the morning, the recruited excitability of the nervous system in general becomes a cause disposing to the attack.

2. *Of augmented excitability.*—Few persons escape with only one attack of epilepsy. There is something in the attack, and in the specific attack, which leads to a repetition of the affection, from the *same* cause or circumstance; whilst an attack itself, when it has fairly receded, seems to protect the patient for a time, by exhausting or diminishing the excitability.

Hence there are cases in which the seizure occurs once in four, six, or eight weeks, not quite regularly, but periodically in some degree.

One patient had an epileptic seizure every second Sunday night, after partaking of pork at dinner. In another, the attack was invariably induced at the recurrence of the catamenial period. In a third, constipation, or fret of the bowels, induced a seizure at any time. In a fourth, the patient re-

* Des Maladies Mentales, t. i. p. 281.

mained well, unless some cause of excitement or disturbance unfortunately occurred.

One gentleman had been long free from attacks, when he was seized in the night, after going to the opera, in the hot weather of the end of July 1847, with the usual symptoms, premonitory of his epileptic seizures.

One young lady had been free from attack for a considerable time, when she was called up earlier than usual to take a journey: she had an attack in the carriage.

The tendency is to periodicity. But this frequently depends on the nature of the cause, as well as on that of the disease, although the principle of exhausted and augmented excitability seems to have its influence.

It is on the principle of augmented excitability that we explain the effects of the cause or causes which first induced the epileptic attack, when these are applied even in a mild form and degree. This observation is specially applicable to the secondary effects of emotion, disturbed sleep, long-continued sleep; to errors in diet, neglected bowels; and to sexual excitement, or uterine irritation.

Sometimes this augmented excitability is congenital, and in this manner epilepsy may prevail in the same family.

On the other hand, the *immediate* effect of an epileptic attack is an *exhausted* condition of the excitability; and the patient seems, when the attack is fairly over, to be secure for a time, until the excitability has again assumed its abnormally augmented condition.

This effect is precisely such as the physiologist observes in his experiments on excitability. The repeated application of a stimulus diminishes the excitability of the spinal marrow or nerves; repose alone is sufficient to restore it. Such, in the living animal, is the effect of sleep; and the long, deep repose of the hibernant animal leads to the most augmented degree of excitability compatible with life and health. The batrachian, taken from its winter quarters, is infinitely more excitable and fit for experiments on the excitability of the nervous system, than in summer.

These physiological views not only enable us to understand the theory or the living pathology of epilepsy, but suggest its proper mode of treatment. The excitability of the nervous

system should be reduced daily by adequate "air and exercise," still short of fatigue; whilst every source of morbific excitement is as carefully avoided. This sustained "air and exercise" is the *safety-valve* of augmented excitability, within just and due bounds; for fatigue leads to reaction, which becomes abnormal, and assumes the form of febricula or of augmented excitability, and augmented susceptibility to the epileptic attack.

§ 3. *The Symptoms.*

It is not improbable that each special exciting cause of convulsion or epilepsy may induce its own special symptoms, as one cause of excitement induces inspiration, another vomiting, &c. or a special form of these, which may, in their turn, prove diagnostic. It can scarcely be doubted that strabismus, that laryngismus, that cheirismus, for example, are severally excited through their appropriate nervous channels. But these have not been distinctly ascertained, or associated together.

It may be said, in general, that that contraction of the muscles of the neck which compresses the jugular and probably the vertebral veins, and that contraction of the muscles of the larynx which induces a more or less perfect closure of this vital air-tube, usually succeed each other, being attended by their special effects on the cerebral and spinal systems, giving rise to cerebral and spinal epilepsy respectively.

Whatever the exciting cause, the first symptom in the epileptic seizure generally is that important one of compression of the veins of the neck to which I have adverted, to which I would call the attention of my professional brethren, and on which the train of other symptoms depends. This sequence may not always be traceable, without unusual care; but I have reason to believe it generally exists, unless, indeed, this affection, and that of the larynx, and the spasm of other muscles, take place simultaneously, or very nearly so. In addition to the fulness of the veins, the carotids are sometimes observed to beat violently, as in venous congestion generally.

I have been much struck, in investigating this subject, with the fulness and graphic accuracy of the description left us of this malady by Aretæus. It is remarkable that this classic

medical author should have adverted no less than three times, in his short description of epilepsy, to the important fact in question. In one paragraph he observes—φλεβων εν τω τραχηλω πληρωσιες και διατασιες; "venarum quæ in collo sunt, repletio atque distentio." In a second, he observes—αγγειων των εν τω αυχενι διατασις ὡς εν πνιγι; "vasorum quæ in collo sunt, distentio, sicut in strangulatione." In the third—εσφαγμενοισι ταυροισι ἠδε ικελη ἡ ξυμφορη; "jugulatorum taurorum in hac calamitate speciem referunt."

The last of these paragraphs, which describes what I have ventured to designate by the term sphagiasmus, is almost immediately followed by another, which may, I think, be taken to signify, or, at least, to include laryngismus: ἡ αναπνοη και ἡ πνιξ ὡς απαγχομενῳ; "ea est respiratio, et suffocatio, ac si laqueo strangularentur."

However this may be, the difference between sphagiasmus and laryngismus is the difference between cerebral and spinal epilepsy. I cannot leave this remarkable author without adducing his account of the third and most characteristic symptom of epilepsy. He observes—γλωσσα προμηκης, ὡς και κινδυνον τρωματος μεγαλου γιγνεσθαι, η αποτομης; "lingua propendit, adeo ut periculum sit, ne vel graviter vulneretur, vel etiam abscindatur." Sphagiasmus, laryngismus, and odaxismus, by which term the bitten tongue may be designated, such are the pathognomonic symptoms of the epileptic seizure; and, confident of the value of terms to fix our ideas, I do not hesitate to recommend them for adoption to my professional brethren.

1. *Of Sphagiasmus and consequent cerebral epilepsy.*—Whatever the *cause* of epilepsy may be, sphagiasmus appears to be the first obvious effect or symptom. From this symptom, which must be viewed in its double aspect of contraction of certain muscles of the neck, and of compression of the veins of the neck, all that is purely cerebral in epilepsy immediately arises; affections of the senses—the eye, the ear, the senses of smell and taste, and of the touch; affections of the intellect, &c.—thus, before the eyes there are flashes of light, flocci volitantes, or mist; in the ears there are various noises, as of a cataract, or of machinery, or of musketry; there is the smell or taste of musk or of fæces; and the sense

of touch is affected by the well-known aura epileptica. In regard to the intellect, we have the "oblivium" and the "delirium breve," so beautifully described by Heberden, with various affections of the sleep, the memory, &c.

The aura epileptica is, like the flashes of light and the tinnitus aurium, a *cerebral* symptom. The application of the *ligature* acts on the imagination, like each new remedy in the hands of Esquirol, like musk, indigo, the amulets, &c.

In one epileptic patient there was a sense of fulness about the throat, on attempting to eat spiced dishes, as "curry." In another, a similar affection was induced on the first inclination to fall asleep.

In both these patients, this sphagiasmus was apt to be followed by laryngismus, and the usual formidable epileptic paroxysm.

In the first patient to whose case I have just alluded, I had quite recently the opportunity of watching this condition of the neck and its veins: the eyes, and especially the right eye, were red and congested: there was tinnitus of the left ear, and a peculiar and characteristic odour of fæces in the nostrils, with confusion of the memory, and of the mind generally; a slight flickering movement of the muscles of the right cheek, and a slight spasmodic movement of those of the left arm, were superadded; nevertheless, this threatening passed off without laryngismus. On other occasions, such symptoms had been speedily followed by laryngismus and frightful convulsions.

As examples of cerebral epilepsy, I may adduce the accounts given by Heberden and Esquirol. The former observes:*—

"Signa epilepsiæ remotiora sunt jactatio, pertubatio animi, capitis dolor, vertigo, aliæque perceptiones molestæ, sopor," &c. "Levis mentis alienatio, vapor e ventriculo ad caput assurgens, qui etiam nonnullos percellet gustu et odore moschi,"....."torpor in brachiis et manibus, perceptio nescio quæ ex artibus extremis sensim per universum corpus diffusa, caligines oculorum, vox balbutiens et inexplanata, aut ex toto suppressa," &c....."Facies nigrescens et spirandi diffi-

* Commentarii, &c., cap. 33.

cultas; postremo animæ defectio levis quæ modo antecedit justam epilepsiam, modo quasi vicem ejus implet, dum nihil aliud æger sentit præter oblivium quoddam et delirium adeo breve, ut fere ad se redeat prius quam ab adstantibus animadvertatur."

Esquirol observes:—

"Les accès épileptiques ne sont pas toujours aussi épouvantables; les convulsions ne sont pas toujours générales; il est des malades qui n'ont que les avant-coureurs de l'accès; d'autres n'éprouvent que le commencement de l'accès qui cesse brusquement. Quelquefois ce n'est qu'un étourdissement, un frissonnement générale, suivis de raideur, ou bien un simple mouvement convulsif d'un membre, de la tête, des lèvres, avec privation instantanée du sentiment. J'ai été consulté pour une jeune dame, dont le père est épileptique, qui est prise de ses accès au milieu d'un cercle, à la promenade, à cheval; elle n'est point renversée, les yeux sont convulsifs, le regard est fixe; l'accès ne dure que peu de secondes, et la malade reprend la conversation, la phrase où elle les a laissées, sans se douter nullement de ce qui vient de lui arriver, et à moins qu'elle ne pousse un cri, personne ne s'aperçoit de ce qui s'est passé: avec les progrès de l'âge, les accès sont devenus plus complets. Poupart cite un fait semblable. Quelques épileptiques ne font que secouer la tête, les bras, les jambes; d'autres ferment seulement la main, quelques-uns courent, d'autres tournent sur eux-mêmes. Le docteur Esparron a reconnu un accès d'épilepsie à un simple mouvement convulsif des lèvres. Les seules convulsions des yeux et du thorax avaient fait porter le même jugement à Pechlin. Ces accès, qui peuvent être méconnus, servent de prélude à des accès qui peu-à-peu, ou avec l'âge, deviennent complets, ou bien ils s'intercalent avec des accès complets, qui ne laissent aucune incertitude sur la nature des uns et des autres; c'est le vertige épileptique*."

I must not, on the present occasion, treat the subject of cerebral epilepsy at greater length. I will merely remark, further, that *all* that depends on sphagiasmus, *all* that falls short of laryngismus, may be viewed, in general terms, as ce-

* Des Maladies Mentales, par E. Esquirol, 1838; p. 277.

rebral epilepsy; whilst all that is beyond this term is violent convulsion, with its further still more fearful consequences in congestion of the cerebrum, of the cerebellum, and doubtless also of the medulla oblongata. How well does the classical Heberden admonish us, that—"instante accessione epileptica diligenter providendum est, ut omnes illæ vestium partes, quæ collum cingunt quamprimum laxentur; *hoc enim interdum adeo tumet, ut strangulationis metus impendeat.*"—p. 144.

If the question be asked—How is this sphagiasmus effected?—I reply, that it is entirely new in medical science, and therefore uninvestigated; and that even if investigated, it may long remain as inscrutable as the slighter but similar sphagiasmus, the precursor and cause of sleep, and as the similar question in regard to blushing, the effect of emotion on the throat and in erection of the penis, whether the effects of emotion or of disease; and that it is, with these similar questions, submitted to the consideration of the future inquirer.

But I may be allowed to *suggest*, perhaps, that, as the orbicularis closes the eyelid when the influence of volition is removed from the levator palpebræ, so the platysma myoides may compress the jugulars, either when volition is removed, as in sleep, or when it is itself excited to spasmodic contraction. But it is to the effect on the jugular veins, however produced, which is indubitable and so important in the theory of convulsive diseases, and to which I have assigned the designation of sphagiasmus, that I beg, in the most especial manner, to draw the attention of the profession.

I will terminate this part of my subject by adducing an important experiment of Sir Astley Cooper, leaving it without comment to the consideration of my auditors, who will not fail to perceive how much greater the effect would have been, if, besides the jugulars, the veins of the neck generally had been compressed, and that suddenly.

"In one rabbit, I tied the jugular veins on each side of the neck. When it was at liberty, it ran about, cleaned its face with its paws, and took green food.

"Its respiration was reduced to sixty-eight inspirations in a minute, which is about half the natural number. After four

hours, it ran about as if nothing had happened, and eventually recovered.

"When it was killed and injected, I found, on each side, three anastomosing veins, passing from the anterior to the posterior part of the jugular vein, and conveying the blood from the head to the heart; but the vertebral vein had remained whole, and become enlarged; and it passed, on the fore part of the vertebræ, from the head to the space between the fourth and fifth cervical vertebræ, where it entered the vertebral canal.

"In a second rabbit, I tied the jugular veins on each side of the neck, as before. The animal's respiration became slow, but it ate green food, ran about, and was difficult to catch; but for five days after it appeared dull; its ears had dropped. On the seventh day it was seen to be convulsed, and frequently rolled over. Its voluntary powers were lost, as well as its sensation, in a great degree. On this day it died. On examination, a clot of blood was found extravasated in the left ventricle of the brain.

"Hence it follows, that apoplexy will occasionally result from an obstruction to the return of blood in the jugular veins; and this I have known to happen from enlargement of the glands in the neck of a boy*."

2. *Of laryngismus and spinal epilepsy.*—All is changed, if, to sphagiasmus, the compression of the veins of the neck, and the consequent congestion of the cerebrum, and the series of cerebral affections which I have described, laryngismus and especially extreme laryngismus, or complete closure of the larynx, with the πνιξ or suffocation of Aretæus, supervene. Terrific convulsions follow: there is odaxismus—the tongue is thrust out of the mouth, and bitten more or less violently by the convulsive approximation of the teeth, or the lip or cheek is drawn inwards, and bitten by a similar muscular action; whilst every other form of convulsive affection occurs, with the appearance of tenfold congestion of the eyes, face, and neck, and doubtless of the organs contained within the cranial cavity and upper part of the spinal canal. The eyelids

* Guy's Hospital Reports, vol. i, p. 471.

and face are sometimes marked by distinct ecchymoses, the effect of this violent congestion.

We observe, once more, a series of convulsive affections, now of the *direct* character, attended or followed by still greater and more dire affection of the encephalon.

The convulsions are seen in frightful distortion of the eyes, face, neck, limbs, and general frame; there are sphagiasmus and laryngismus, with the appearances of strangulation; there are foaming at the mouth, protrusion of the tongue, violent closure of the maxillæ, the foam being frequently bloody, the tongue severely wounded, the teeth gnashed together; meanwhile there may be expulsion of the urine, semen, or fæces.

Sometimes the convulsion draws the eyes, head, neck, and general frame to one side, affecting the hand and foot of that side more than the other; and sometimes those limbs are left feeble and slightly contracted or paralytic, and the patient appears hemiplegic.

More constantly the state of congestion of the encephalon is attended by deep and lasting coma, or followed by a paroxysm of mania; and, after repeated attacks, the memory and the intellect may fail.

If I do not prosecute this description further, it is because my object is only to notice the series of phenomena from which the THEORY of epilepsy must be deduced.

I may here adduce two facts which are not without their interest in this point of view. Previously to the seizure there is a peculiar odour of the breath. (In one case it was that of apples, whilst there was an eruption of herpes oris, and great irritability of temper.) Subsequently to the attack, there is frequently the deposit of the lithic acid sediments in the urine.

I may now briefly recapitulate the views which I have formed of the epileptic seizure. 1. Some source of irritation, acting in a reflex or direct manner, excites the spinal system. 2. Contraction of certain muscles of the neck, compression of the jugular veins, and congestion of the cerebrum, with cerebral symptoms, cerebral epilepsy, are the consequences. 3. Then follow laryngismus, with every formidable convulsive symptom—spinal epilepsy—and congestion of the encephalon

in a tenfold degree, with all its dire effects on the intellect and on the limbs.

In dismissing the subject of laryngismus, I would beg to recommend to my readers the perusal of an admirable, but I think unappreciated, little work, by M. Bourdon, entitled, "Recherches sur le Méchanisme de la Respiration et sur la Circulation du Sang;" published in 1820. It is replete with the most valuable and interesting observations on the condition of the larynx in the various *efforts*, whether of the voluntary muscles, or of what were then designated the involuntary, as in vomiting: in these, this organ is closed, and made the fulcrum for the action of these muscular forces.

§ 4. *Of the Tendency of Blood to the Head.*

We hear much in medical consultations, and read much in medical works, of tendency of blood to the head. The event may be regarded as a fact, ascertained by experience. It is a fact of great importance too, for it is the precursor, and may be taken as the monitor, of many serious affections of the encephalon, not of an epileptic character only, but of the apoplectic.

Yet has no one suggested the real nature of this affection. The heart and arteries are, I believe, vaguely supposed by the "mere practical men" to possess some power of effecting this marked and undue distribution of the blood; but the physiologist knows that no such power exists, or can exist. The phrase, "*undue tendency* of blood," is an erroneous one, originating in a false hypothesis, and leading to false conclusions. The expression *impeded return*, or congestion, should be substituted for the term tendency; and the cause must be sought in excitants of spinal action, and in the condition of the veins of the neck, and not in the heart and arteries. It is this topical congestion, and not mere general plethora, that is the object of our study; for it may co-exist with a state of anæmia of the general system.

The real and immediate cause of this condition of the circulation within the head, is that sphagiasmus, or obstructed state of the circulation in the jugular and other veins of the neck,—for I take no limited view of this subject,—to which I

have so particularly adverted. The cause, or series of causes and effects, and new causes, of this, and its precise influence on the organs within the cranium, with the remedies, are the objects of the physician's anxious and earnest inquiries.

The most prompt remedy, in many circumstances, is the induction of vomiting, either by an effectual dose of ipecacuan, or by irritation of the fauces —a measure of far greater value, in *many* points of view, than is generally supposed.

In the tendency of blood to the head, or rather, in its congestion there, the evacuation of the stomach and intestines, and bloodletting, general and topical, are the important remedies, the causes and its effects being equally treated.

§ 5. *The Diagnosis.*

In the following brief observations on the diagnosis of the epileptic seizure, I purpose merely to state the differences which exist between this and *some* other diseases of the nervous system.

It is frequently difficult to establish a confident diagnosis in the cases of epilepsy limited to cerebral symptoms. Some such symptoms, entirely independent of an epileptic character, occur from derangement of the digestion. In some cases it is difficult to determine whether the malady has most of the character of cerebral epilepsy, or of faintishness or slight syncope. And I have carefully noted nausea, vertigo, faintishness, and a cold, clammy perspiration, occurring together, or in succession, and requiring great skill and prudence in the physician in forming and expressing an opinion; the case is, in reality, very different from true epilepsy.

It is when cerebral symptoms occur and cease suddenly, without the symptoms which I have just enumerated, that we may fear lest they should partake of the nature of epilepsy.

But when laryngismus, and especially when odaxismus occurs, there can be no doubt that the case is epileptic. This last is *the* most pathognomonic symptom of this dire malady.

The great distinction between any form of hysteria and epilepsy, consists in the *absence*, in the former, of these three symptoms—sphagiasmus, laryngismus, and odaxismus,—and of the consequent absence of cerebral congestion, and of real convulsion. In hysteria, there are, indeed, some forms of

laryngismus, especially the stridulous, denoted by loss of voice, or strange croupy inspirations or cough, as there are struggles and various violent movements of the body and limbs; but a very little attention and experience will enable us to distinguish these affections from the epileptic laryngismus and from real convulsion.

It is the absence of sphagiasmus which prevents the accession of real insensibility in the hysteric attack; it is the absence of laryngismus which prevents the accession of real convulsion.

In epilepsy, sphagiasmus is, as I have said, usually the very first symptom; all that follows is, therefore, however frightful to behold, unattended by suffering in the patient. Even laryngismus, so terrific to the hydrophobic patient, is unfelt in the epileptic.

But cases do occur in which the patient is conscious of the impending attack—that is, sphagiasmus is either absent or exists in too mild a form to induce insensibility: there are then cerebral or laryngeal symptoms which strike the patient with horror or terror.

As the sphagiasmus, so the laryngismus may be imperfect; in the latter case, the attack is attended by various noises, sometimes assuming the character of shrieks, sometimes of the crowing inspiration.

In like manner odaxismus is frequently absent.

Epilepsy may, indeed, however formidable in its essence, assume the form of the mildest or of the most dire of human maladies. It might be interesting to trace the various classical allusions to this disease as being portentous of the anger of the gods, or of national calamities; but such an episode would detain us too long on this occasion.

It is interesting to observe, that whilst the series of symptoms in epilepsy is such as has been described—whilst, in hydrophobia, the patient is subjected to a fearful suffocative paroxysm of laryngismus, without sphagiasmus and its attendant insensibility,—in tetanus we witness neither of these symptoms: the maxillæ are affected with trismus, and the neck is variously affected by tetanic spasms, but the jugular veins are not compressed, nor is the larynx closed: the action of the pharynx is, however, frequently involved in this

disease. In chorea, and in the paralysis agitans, the jugular veins, the larynx, and the pharynx, all escape: it is, apparently, the system of purely voluntary muscles which are affected; and this affection is not precisely convulsive or spasmodic: the muscles of the articulation, of the neck, of the hands and arms, and eventually of the rest of the body, are agitated, the acts of volition being perverted and thwarted, as it were, by emotion and the excito-motor power; so peculiar and distinct are the several diseases of this class, when viewed by the light of physiology!

Similar as epilepsy may appear to the convulsions of children, there are some points of difference which deserve to be noticed. In the latter, whilst odaxismus is scarcely known, and incomplete laryngismus is common, the affections of the hands and feet are pathognomonic, whilst sudden dissolution, on the one hand, and recovery on the other, are more frequent than in epilepsy.

§ 6. *On* Sphagiasmus *specially.*

Even the unprofessional bystander hastens to loosen the cravat and collar of the patient seized with epilepsy, so obviously is he affected with the usual signs and appearances of strangulation. Aretæus, as I have already stated, compares the epileptic patient to the strangled bull, or to the animal round the neck of which a cord has been tightened.

In both these cases, that condition of the jugular vein is induced which I have designated sphagiasmus; and it is of no little interest to observe how similar, in many respects, the two cases prove to be.

In both there are compressed veins of the neck; in both there is congestion of the cerebrum, with *instant* insensibility; in both there are protrusion, tumidity, and lividity of the tongue; in both there are convulsions; in both there may be erection of the penis, with expulsion of semen.

Epilepsy is strangulation, and strangulation is epilepsy; and as the nature, so the treatment of the two cases must be similar.

I need not pursue this parallel further. It is obvious that the two cases throw a ray of light on each other.

§ 7. *Action of the Platysma Myoides, &c.*

But it will naturally be asked, by what agency are the jugular veins compressed?

There is an extensive muscle in the neck, the use and influence of which has, I believe, never been ascertained. This is the platysma myoides. I give the description of this muscle by Sir Charles Bell, for many reasons the best authority on this subject:

"The platysma myoides is a very thin muscular expansion, which is spread over the other muscles of the neck and throat, which extends upwards, upon the lower part of the face.

"It arises by scattered fibres, which are attached to the cellular membrane, betwixt the pectoral and deltoid muscles, and the skin of the chest. It extends upwards and forwards, over the clavicle and the mastoid muscle, going, like a thin integument, over the neck. It terminates on the face and jaw. Some of its fibres, mounting over the bone of the jaw, are inserted near the depressor anguli oris.

"This muscle supports the parts in the neck, as fasciæ do elsewhere; it compresses veins, and forces the blood down into the chest, when there is difficult respiration; it is, in truth, more a muscle of respiration and circulation, than for the motion of parts, or even for expression; yet it is very active in the expression of the stronger passions. In dissecting this muscle, the surgical student will have a regard to a very important part of the surgical anatomy of the neck. Although there be no proper fascia investing the neck, for very obvious reasons, yet the fibres of this muscle, interlacing with the common cellular membrane, form a pretty dense and firm covering.

"It will be noticed, in dissection, that this compound web is very particularly connected to the transverse processes of the vertebræ, to the mastoid process, and to the angle of the jaw. It will be found, also, to be connected to the clavicle and first rib; and to make a sort of septum betwixt the region of the neck and the thorax*."

It may well be asked, how the compression of veins can

* The Anatomy and Physiology of the Human Body. By John and Charles Bell. 1826. Vol. i, p. 261.

promote the flow of blood along them. It is obvious that it can only empty them, pressing out the blood which they contain; and that, if continued, it must arrest the further flow of blood through them. This, therefore, is the chief effect of the platysma myoides. The fact is proved by its anatomical relations, and it is further proved by direct observation on their pressure. I have seen the integuments of the neck raised momentarily, in an extraordinary manner, by the action of these muscles, and I have observed the external jugular veins start, as it were, into existence, equally suddenly and momentarily.

There are two occasions on which the physiological action of this muscle occurs. On the first, the platysma myoides may be compared to another subcutaneous muscle, the orbicularis, contracting, as that muscle does, on the approach of sleep, when, from fatigue or other causes, the mind, with volition, reposes, and the voluntary and antagonist muscles are thrown out of action; the platysma myoides contracts on the same principle of spinal origin, compresses the jugular veins, and induces cerebral congestion—and *sleep*. On the other, this muscle is called into action by emotion, and induces that condition of the capillary vessels seen in the face, neck, and chest, in *blushing*, the effect of shame—of *flushing*, the effect of anger, &c.

We cannot be surprised, if pathological conditions of the same muscle, with corresponding effects, should occur. Such an event is, I believe, the frequent exciting cause of the epileptic seizure—sometimes, I believe, of the maniacal paroxysm; and sometimes of the epileptic and of the maniacal paroxysm consecutively; sometimes of apoplexy.

In very thin persons, I have observed much of this play of the platysma myoides, and of the effect on the jugular veins. But I do not limit my views to this muscle, or to these veins alone, absolutely. The muscles and veins of the neck generally are rather to be considered, and I propose the subject for new investigation.

Meantime the analogy between the orbicularis, the platysma myoides, and the panniculus carnosus of the hedgehog, for example, cannot fail to strike the physiologist and pathologist.

The effect of this sphagiasmus, whether in sleep, in emotion, or in the epileptic paroxysm, on the capillary circulation of the eye, of the integument, and doubtless of the encephalon, must be carefully observed: in sleep, the eye—in emotion, the cheek, is suffused; and in epilepsy, ecchymoses even appear—the effects of congestion. Can any subject offer greater interest to the philosophical and observant physician?

§ 8. *Coma; Mania; Syncope; Hemiplegia.*

The epileptic attack usually issues in coma. This continues variously for hours or days. It may yield only to the lancet, or it may prove fatal. It is the purest congestive apoplexy.

Or, after the cessation of the convulsive paroxysm, the congestion may subside, leaving the blood-vessels strained, as it were, and in that condition which leads to delirium or mania.

In one case, paroxysms of aberrations of mind occur and subside in the manner of the epileptic paroxysm.

In another, the respiration and the pulse were long and fearfully suspended.

The epileptic seizure is frequently hemiplegic—that is, an affection of one side of the body. It frequently leaves a hemiplegic weakness, or paralysis.

That these cases are, in their causes, as in their effects, peculiar and specific, there can be no doubt; but of all this, observation has hitherto taught us nothing.

The same remark applies to the cases in which the series of symptoms which I have enumerated occur successively or simultaneously, or in which one or more, as laryngismus or odaxismus, are present or absent, constituting one source of the diversity in the attacks of this disease.

§ 9. *Partial Convulsion or Epilepsy.*

There is no symptom of epilepsy, however important, which may not be absent. Sphagiasmus may be absent, and then the patient is conscious of the laryngeal affection, is struck with horror, and utters a terrific shriek or scream, or laryngismus stridulus. Laryngismus may be absent, and then the sphagiasmus induces the immediate loss of sensibility; or if it

exist in a minor degree, the symptoms of the cerebral form of epilepsy. Odaxismus may be absent, and this most pathognomonic sign of epilepsy may be wanting.

But the convulsion may be limited in every mode and degree. Whilst this paper is preparing, I have been summoned to a patient in whom convulsion seized the muscles of the left side of the face and of the left arm, exclusively of the leg, and of the entire right side, issuing in hemiplegic paralysis. There were very partial sphagiasmus and cerebral affection, and equally partial laryngismus, with altered voice, cough, and mucus. I have not seen a case of such deep interest. No one would think of designating this case epilepsy. Yet where can we fix the limits between this and the epileptic seizure in its various partial forms?

§ 10 *The Medulla Oblongata, &c.*

The chief organ affected in laryngismus, epilepsy, and general convulsive diseases, either in a reflex or direct manner, and the source of the direst symptoms and phenomena, is the medulla oblongata, to which must be added the tubercula quadrigemina above, and the spinal marrow below, this *nodus* vitalis of the nervous system.

This view of the subject is most momentous. It explains the symptoms, and enables us to comprehend their relative importance and magnitude. It points to the diagnosis—it points to the proper locality for the application of topical remedies.

The condition of the larynx—the laryngismus—the condition of the respiration; the sphagiasmus; the venous congestion; the movement of the tongue and the closure of the maxillæ, implied in the occurrence of odaxismus; the action of the expulsors; &c. &c. *all* depend on the influence of this all-important, complicated region of the spinal system.

To this region, all that is nervous, all that is vascular (I have already said that the vertebral veins are more jugular than the jugulars themselves), tends *in the first instance;* from this region, all that is muscular emanates, *in the second;* then follows the augmented venous congestion of the encephalon—of the cerebrum, and especially the medulla oblongata—with coma and general convulsion.

Epilepsy may, in a certain sense, be said to be an affection of the medulla oblongata!

The same remark applies to the convulsions, the laryngismus stridulus especially, of infants.

Convulsive diseases may indeed be divided into those in which the larynx *is*, and those in which the larynx *is not*, affected; in the former, the case is also one of affection of the medulla oblongata; in the latter, of the medulla spinalis.

§ 11. *Post-mortem Appearances.*

Epilepsy of reflex origin leaves the effects of congestion of the encephalon, consisting chiefly of effusion into the ventricles, and on the surface, and at the base of the cerebrum.

But *any* chronic affection of the encephalon, including the membranes, cerebrum, cerebellum, medulla oblongata, nerves, *may* assume, in its course, the form and character of the epileptic seizure and convulsion, and may, therefore, be found in addition to the effects of congestion.

There is another source of epilepsy. This is mal-development, with its usual consequence, I believe—viz. disproportion between the size of the cavity of the cranium, and that of its contents, upon the latter of which, therefore, undue pressure is made, with counter-pressure on the medulla oblongata, and epileptic paroxysms.

From all this it will appear how inadequate is the term epilepsy to designate a disease. In this, as in so many other cases, it would be well to adopt a generic term, and invariably to use it characterized by an epithet, signifying its individual nature, or the fact that that is unknown.

§ 12. *Proposed Rejection of the term Epilepsy.*

I would, indeed, earnestly propose the rejection of the term epilepsy from medical, and, indeed, all other, language. Like the term insanity, it stamps the poor patient for ever, inflicting a stigma which is frequently most injurious, and which can only be compared to that state of things in a darker and more cruel age (if possible)—perhaps it was only still *more* ignorant and superstitious—when the bystanders spat, in disdain, into the sufferer's bosom! But, as I have said, like all terms, it has an influence on the very conduct and pro-

eeedings even of the physician. Let us substitute the word convulsion. Who would propose to treat convulsion by administering *a* remedy? Do we treat the convulsions of children, or of the puerperal patient, in this manner? Do we not consider the case in *all* its bearings, and administer *every* curative measure? Do we not, in a word, treat the case scientifieally, and not empirically? But if we designate a given ease by the term epilepsy, do we not, forthwith, begin to think of musk or of indigo?

§ 13. *Of the Treatment.*

How inadequate and derogatory is the idea entertained by the public, and by many physieians, of what is required for the treatment of a patient afflicted with epilepsy! It would seem that their notions of the medical art cannot be raised above that of diseovering *a remedy* for *a disease.* Let sueh persons read what I have written, and let me ask them whether it is a remedy, or *a system* of remedies—of juvantia and of lædentia—that must be carefully attended to.

The idea of a remedy, even, is a superstition, except in a few rare instances. The trust in an amulet, a necklace, a ring, is not a more deplorable weakness than that whieh is implicitly plaeed by many in Baron Sloët's powder, in musk, in indigo, in a valerianate, in homœopathy. Alas! I have known persons of rank and fortune trust the health of those whom they hold most dear, to sueh follies, whilst they expose their patient to the morbid influences of a polluted and heated atmosphere, of excitement, of late hours, of that combination of evils, the opera—casting off common sense, to say nothing of scienee and philosophy.

And yet some good is attained by this empiricism. The *confidence* of the patient is a security against many baneful emotions, and *time* is gained for Nature to cure the disease.

What is then the proper treatment of epilepsy? First, let us well consider the *causes* of this dire malady, and serupulously avoid them; then let us weigh the *effects* of some of these, and of the seizures themselves, in the exeited condition of the spinal system, and the congested condition of the cerebral, and let us administer every rational remedy to subdue the one and remove the other.

If the cause of the epileptic affection be gastric or enteric irritation, the more promptly the stomach and intestines are relieved, the better; to drink plentifully of tepid water or barley-water, and to excite vomiting by means of a feather passed into the throat; then to administer an ample enema of warm water, are the first measures to be taken.

That irritation is frequently combined with acidity, and then a scruple of the bicarbonate of potass is useful.

This may be followed by a decided purgative medicine, combined with the same antacid.

In that form of epilepsy which arises from uterine excitement, every precaution should be adopted which can allay this latter. The genial warmth of bed, the additional warmth of flannels round the uterine region, fomentations, warm injections in vaginam, warm and opiate enemata, baths antecedent to and during the period of excitement, especially if this be catamenial.

I need say nothing on the precautions necessary relative to sexual excitement in the male sex. It is, as Democritus said, itself a μικρα επιληψια; and Aretæus observes—Οργη δε, και λαγνειη, κακον· και γαρ το πρηγμα του νοσου φερει τα συμβολα. It must be avoided.

The next point which demands attention is the state of sphagiasmus. The head should be raised, the neck should be exposed, forced deep inspirations should be drawn voluntarily, if the patient retain his sensibility, or should be excited by dashing cold water on the face, if insensibility have supervened, in order that the veins may be relieved, and the larynx opened.

The rest of the treatment at this period of the seizure consists in free exposure of the face and neck to the open air, or to a current of air, and the application of a cold spirit lotion to the head, and of fomentations to the feet; and if there be convulsion, in guarding the patient against accident or injury.

Much depends upon the due regulation of sleep. Every precaution should be taken to prevent the sleep from being too deep, and from being suddenly disturbed. With these objects, I recommend a very early hour for retiring to bed, with some one constantly but quietly moving about in the room. Such early sleep, and so quietly interrupted, is not so

deep as that which takes place at the stiller and darker period of midnight. The patient may be watched, too, and if there be any disposition to stertor, may be gently awakened, or his position may be gently changed, or he may be fanned, or a little water be placed within his lips.

The object is to ward off the attack, both on account of the present evil, to break the habit of periodicity, and to save the cerebral system from the dire influence of violent congestion.

The disposition to augmented excitability is to be remedied by *free exposure to the open air, with exercise.* There is no easier or more royal road to cure.

All mental excitement must be avoided: heated rooms, late hours; the opera, the theatres, which combine all the lædentia in one, must be avoided.

The diet must be simple and nutritious, without stimulus; the bowels must be carefully watched and regulated, with the secretion of the kidneys; and the skin must be excited by means of a coarse towel, and sponged with cold or cool water, or salt and water, and again rubbed, night and morning.

All these things must be done, and carefully and perseveringly done, by those who would do *everything* to remove this great, this Herculean evil. Once more I assert, there is no royal road to health in such a case; and they who trust to a mere remedy, whether it be fœtid as the assafœtida itself, or fragrant as musk, or blue as indigo, or be brought from as far as the Hague, or from the Indies, to the neglect of all the means which can *reasonably* conduce to recovery and to health, are guilty of the danger to mind, or limb, or life, of the unfortunate patient.

If I were to fix on *one* remedy for epilepsy, it would not be valerian, indigo, or zinc, but judiciously administered 'air and exercise.' But, as I have said, the idea of *a* remedy for epilepsy is unphysiological; the treatment, and, when this can be effected, the cure, consist in a well-administered plan, embracing every means of good, and avoiding every means of harm, fully and perseveringly. With these views—and again I say there is no "royal" road to health any more than to geometry—many a case hitherto deemed hopeless *is* curable.

I would, if there were time to spare, detail examples of

many happy results, and of many provoking, because unnecessary, failures, in my treatment of epileptic patients.

The occasion is not one for indolence or remissness, or of a foolish superstition and trust in an amulet or a valerianate, but of a sustained attention to diet, to the condition of the bowels and of all the secretions, to "air and exercise," to early and regulated sleep; all excitement, all emotion, all effort or fatigue, all the exciting causes, being avoided as carefully as possible. These things being done, let every probable remedy be added and proved; let us omit nothing which can *conduce* to health and recovery.

Whenever the fits of epilepsy return during *sleep*, a special part of the treatment should be directed, as I have already stated, to this point; one or more short sleeps should be taken during the day in the *upright* position; the patient should go to bed early, and be carefully watched. On the least indication of sphagiasmus, or of laryngismus, or of dreaming, some gentle means of interrupting, or of diminishing the degree of the sleep should be adopted. Or, better still, some occupation should be pursued by others in the patient's bedroom, so as to prevent the sleep from being profound. To read the patient to sleep, to continue reading by way of gentle excitement during the first sleep, are also important measures. If I revert to this topic, it is on account of its extreme importance.

If there be symptoms threatening an attack of epilepsy during the day, the patient should again be watched; cold water should be dashed on the face, so as to induce sobbing, or deep and sudden inspirations should be made voluntarily. By these means the veins of the neck are emptied, and cerebral congestion removed.

Whatever the probable exciting cause may be, it should be removed; if this be gastric irritation, copious draughts of tepid barley-water should be swallowed, and then a feather should be used, so as to irritate the fauces and excite vomiting; and a scruple of the bicarbonate of potass should be administered: if it be intestinal irritation, a copious enema of tepid water should be administered: if it be uterine, fomentations, enemata of *warm* water, vaginal injections of warm water, the genial warmth of bed, and of abundance of flannel

applied round the uterine region, and to the feet, should be adopted.

Everything should be done to ward off the attack, to break the chain of periodicity.

Every means should be adopted to diminish the excitability of the patient, especially that all-important one of "air and exercise," and that in such *measure* as will attain its just object.

Everything must be done to induce the best possible state of the general health.

Then, and then only, every supposed specific, every remedy which ingenuity may devise or experience suggest, should doubtless be administered.

In every part of the treatment, as in the diagnosis of the specific form of the malady, we must be guided by our knowledge of the THEORY of this dire and Protean malady; its causes must be avoided; their effects must be removed, &c.

It has been erroneously said, that "to know the disease is half its cure;" but it may be affirmed with truth, that THUS *to know the disease is* ALL *its treatment!* Epilepsy is frequently not so incurable in itself, as in the ignorance, and superstition, and indolence of the patient or friends.

This paper has, perhaps, already reached too great a length. I must therefore postpone some special remarks on *puerperal convulsion* to another opportunity. There are many and most important questions to be solved in regard to this and other forms of convulsion. Does it lead to subsequent attacks of epilepsy? Do previous attacks of epilepsy predispose to puerperal convulsion? In this latter, is there sphagiasmus, laryngismus, or odaxismus? What relation is there between puerperal convulsion and puerperal mania? and between convulsion, or epilepsy, and mania, or insanity, and paralysis in general? What scope for new investigation!

CONCLUDING NOTE.

ON SPASMO-PARALYTIC AFFECTIONS.

Spasmo-paralysis requires to be treated apart from all other diseases of the nervous system. Spasm is always an affection of the *spinal* system; bare paralysis may be of cerebral or spinal origin; spasmo-paralysis is, therefore, in every case spinal, in its incipient stage, whilst it may be cerebral or spinal in the issue.

The physical *cause* of these affections *may* be seated in any tissue or organ, even in the cerebrum itself; but it *must* be *so* situated as to affect, by reflex action, by contact, by pressure, or by counter-pressure, some part of the spinal system.

I have only space, in this brief Note, to give an idea of this subject; and I believe I cannot do so better than by enumerating a few actual cases of spasmo-paralysis.

The child of a medical friend of mine, in an adjoining street, had an attack of spasm, followed by paralysis, of one extremity. The little daughter of another had slight spasm of one side, followed by almost complete hemiplegia.

A pupil had attacks of epilepsy; they have left the left arm paralytic.

A lady, living sixty miles from town, had severe convulsions of the left side of the face and left arm, followed by nearly complete paralysis. The spasmodic and paralytic condition alternated several times.

Chorea and the paralysis agitans frequently involve a degree of hemiplegic weakness.

Lastly, the disease termed 'ramollissement' of the brain combines spasm and paralysis in a variety of forms and degrees, which require to be traced most accurately. This must be done before we can offer any satisfactory rationale of the symptoms of this malady. The disease is one of the cerebrum.

Why then is there *spasm?* Why are there frequently spasm and then paralysis successively of the *same* limb or side, on the same or opposite side in reference to the seat of the disease in the brain? The physiologist will feel interest in this question; the physician will appreciate its importance in a diagnostic and practical point of view; for here again physiology and practice are associated together.

In one case, paralysis occurred first, and was succeeded by convulsive affection.

The whole question is one of intense interest and importance, which, with so many others, I beg to recommend for new investigation.

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